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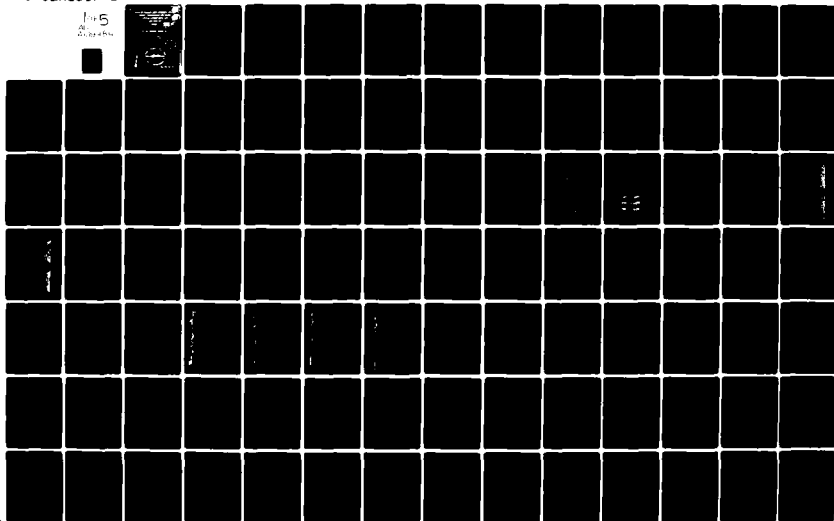
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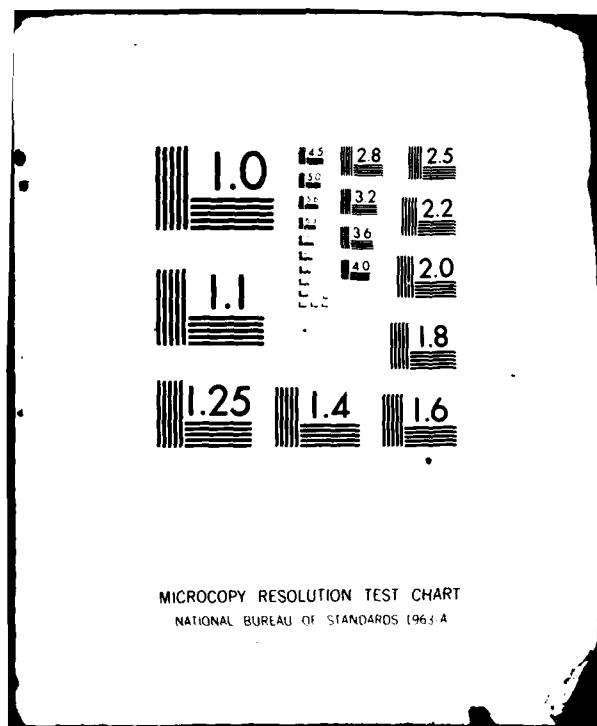
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ARCTIC ICE DYNAMICS JOINT EXPERIMENT 1975-1976
PHYSICAL OCEANOGRAPHY DATA REPORT
PROFILING CURRENT METER DATA -- CAMP BLUE FOX

Volume 2

prepared by

T.O. Manley, Kenneth Hunkins, Werner Tiemann

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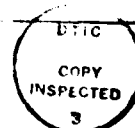
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ABSTRACT

ARCTIC ICE DYNAMICS JOINT EXPERIMENT 1975-1976
PHYSICAL OCEANOGRAPHY DATA REPORT
PROFILING CURRENT METER DATA - CAMP BLUE FOX
VOLUME 2

by T.O. Manley, Kenneth Hunkins, and Werner Tiemann

The oceanographic program of the 1975-1976 ARCTIC ICE DYNAMIC JOINT EXPERIMENT (AIDJEX) was designed to investigate the Arctic Ocean on space scales of 100 kilometers in the horizontal and hundreds of meters in the vertical. This was accomplished with oceanographic observations from a triangular array of three smaller manned satellite camps with a centrally located larger main camp. The radio call signs of the satellite camps were Caribou, Blue Fox, and Snowbird, the main camp being designated Big Bear.

Profiles of relative current speed and direction were measured twice each day between the surface and 200 meters at each of the four camps. A profiling current meter (PCM) with speed, direction and depth sensors was lowered and retrieved with a multi-conductor cable at a slow rate of 5 meters per minute. Sensor signals were transmitted by cable to be recorded graphically and digitally at the surface. Digital recording of the data at a slow rate of 1 scan per half minute along with a low signal-to-noise ratio made it preferable to manually digitize the analog charts to preserve as much information as possible.

The final data set consisting of absolute velocity profiles of speed and direction was obtained by the vector addition of the relative PCM profiles with the interpolated ice velocity based on precise satellite navigation at the time of the observation. Data reduction problems included a hysteresis effect between up and down traces due to cable angle, directional spikes resulting from a rapid sensor package rotation, and spurious results when low velocities are added vectorially.

Relative speed between the ice and water in the upper mixed layer is often small indicating that this layer closely follows the ice motion. Persistent large clockwise shears in relative current direction occur sometimes in the mixed layer, attaining up to 540 degrees of rotation. These are best seen in the relative velocity data. Upon the addition of the ice velocity vector, to produce absolute velocities, the smooth relative directional shear of the Ekman spiral then exhibits local shears and speed minimums. This is due to the directions and speeds in the spiral being opposite or nearly opposite to the ice velocity vector and of comparable magnitude.

One of the most striking features of the current profiles is the appearance from time to time of swift currents below the mixed layer with speeds attaining 60 cm/sec. The depth of maximum velocity ranges from 80 to 190 meters. Although evidence of swift transient undercurrents had been observed in the Arctic Ocean as early as 1937, it was not until 1974 that these currents were shown to be associated with mesoscale eddies.

This data report deals only with the absolute velocity data obtained from the profiling current meter at Camp Blue Fox. PCM data for camps Caribou, Snowbird and Big Bear are in separate volumes (Manley et al., 1980). Data reports pertaining to the salinity-temperature-depth (STD) data taken at the manned AIDJEX camps are also in separate volumes (Bauer et al., 1980).

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INTRODUCTION

The objective of the AIDJEX oceanographic program was to monitor velocity and mass fields in the upper levels of the Arctic Ocean from the four manned camps in order to provide an understanding of the interaction between ice and water.

The initial deployment of the manned camps began in March of 1975 with the establishment of the main camp, Big Bear. The satellite camps were then established during the next month and a half. The scientific program at each camp began as soon after its establishment as possible. Inclusive dates for the beginning and ending of the profiling current meter work done at each camp is listed in Table 1. Big Bear broke up in early October of 1975 and its scientific and logistic functions were transferred to the satellite camp Caribou. All of the other camps remained in operation until the closing, according to schedule, in May 1976. Figure 1 shows the position of the camps during the initial deployment in March of 1975.

The drift tracks that each camp made during the duration of the experiment are shown in Figures 2 through 5. A thumbnail sketch locates the plotted region with respect to the Alaskan and Canadian coasts. The asterisks indicate the positions at integral multiples of 20 days. The beginning and ending days are noted for each trajectory. A dashed line indicates a period of missing data. The region is 500 kilometers by 500 kilometers aligned with the x-y coordinate system shown in Appendix 1. Figures 2-5 were taken from Thorndike and Cheung, 1977.

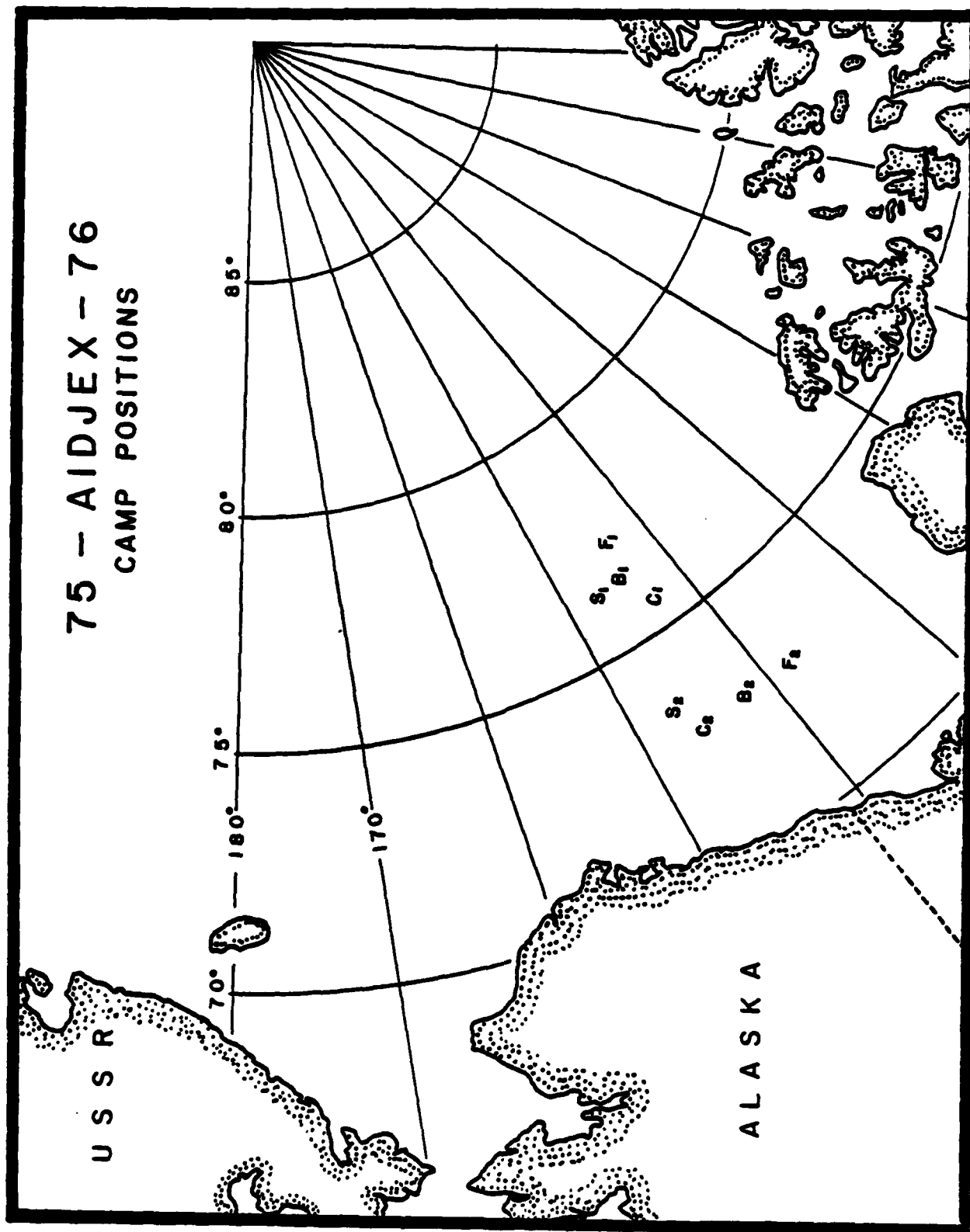


Figure 1. Beginning and ending positions of the four manned AIDJEX camps Caribou (C), Blue Fox (F), Snowbird (S) and Big Bear. Subscripts of 1 indicate the beginning positions. A subscript of 2 indicates the final position of the camp.

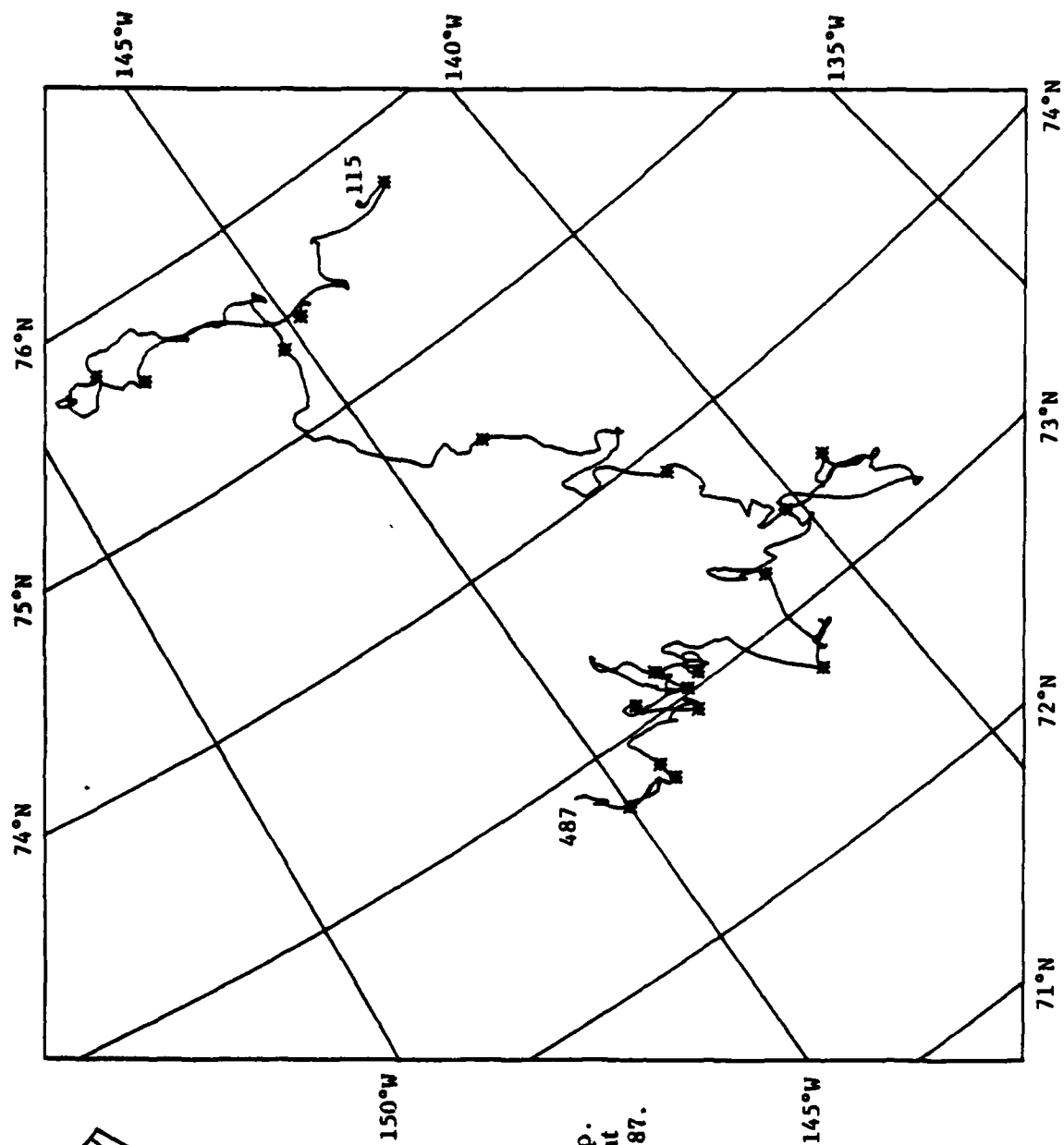


Figure 2.

Camp Caribou

Became the main camp
after Big Bear broke up.
Measurements by NavSat
from day 115 through 487.

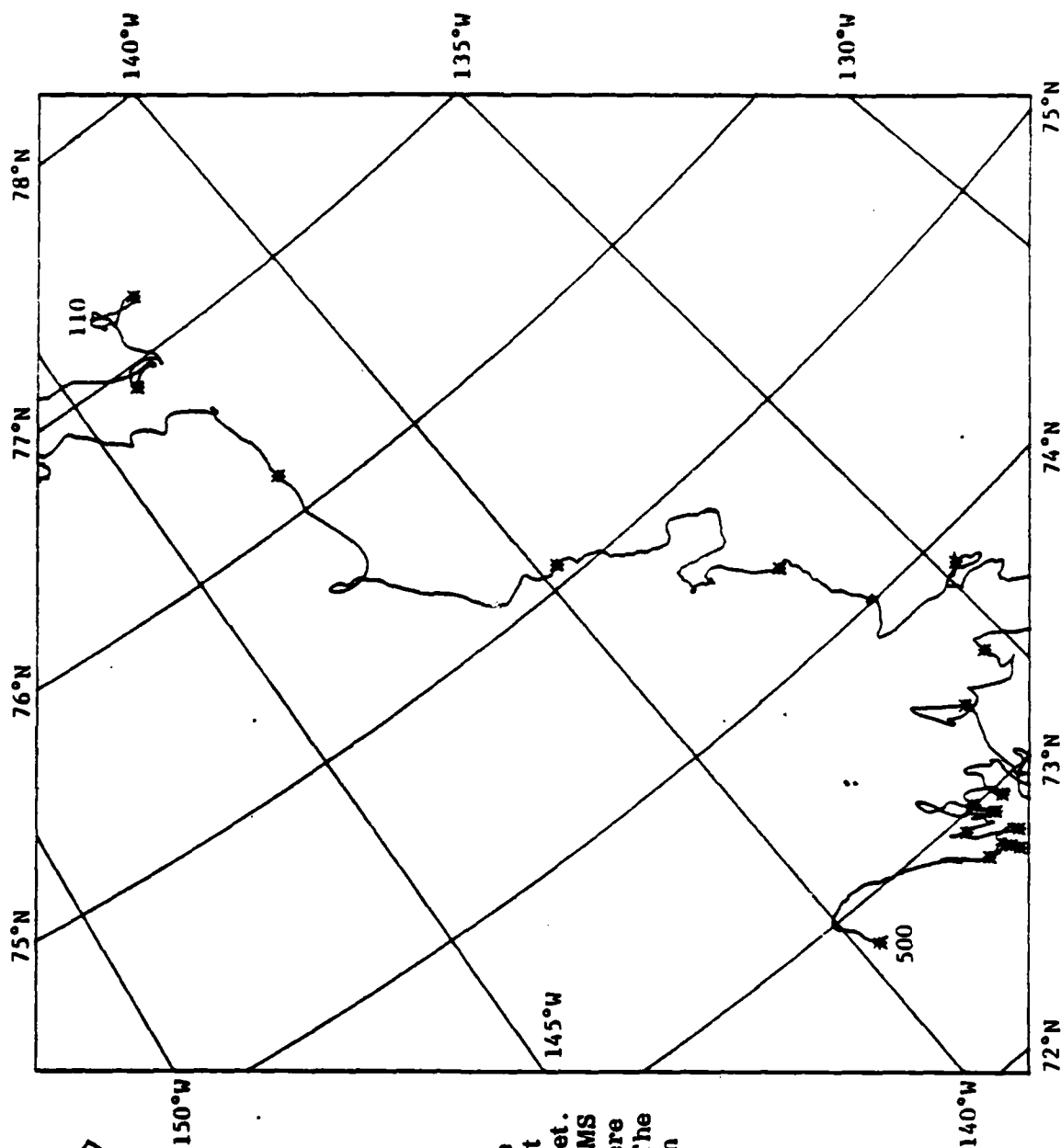


Figure 3.

Camp Blue Fox

Measurements by NavSat from day 110 through 489 with a gap from 203 to 208. Celestial position fixes were made during that period but were not used in the data set. After day 490 data from RAMS buoy R 772 were used. There is a gap from 531 to 573. The buoy was last heard from on day 579.

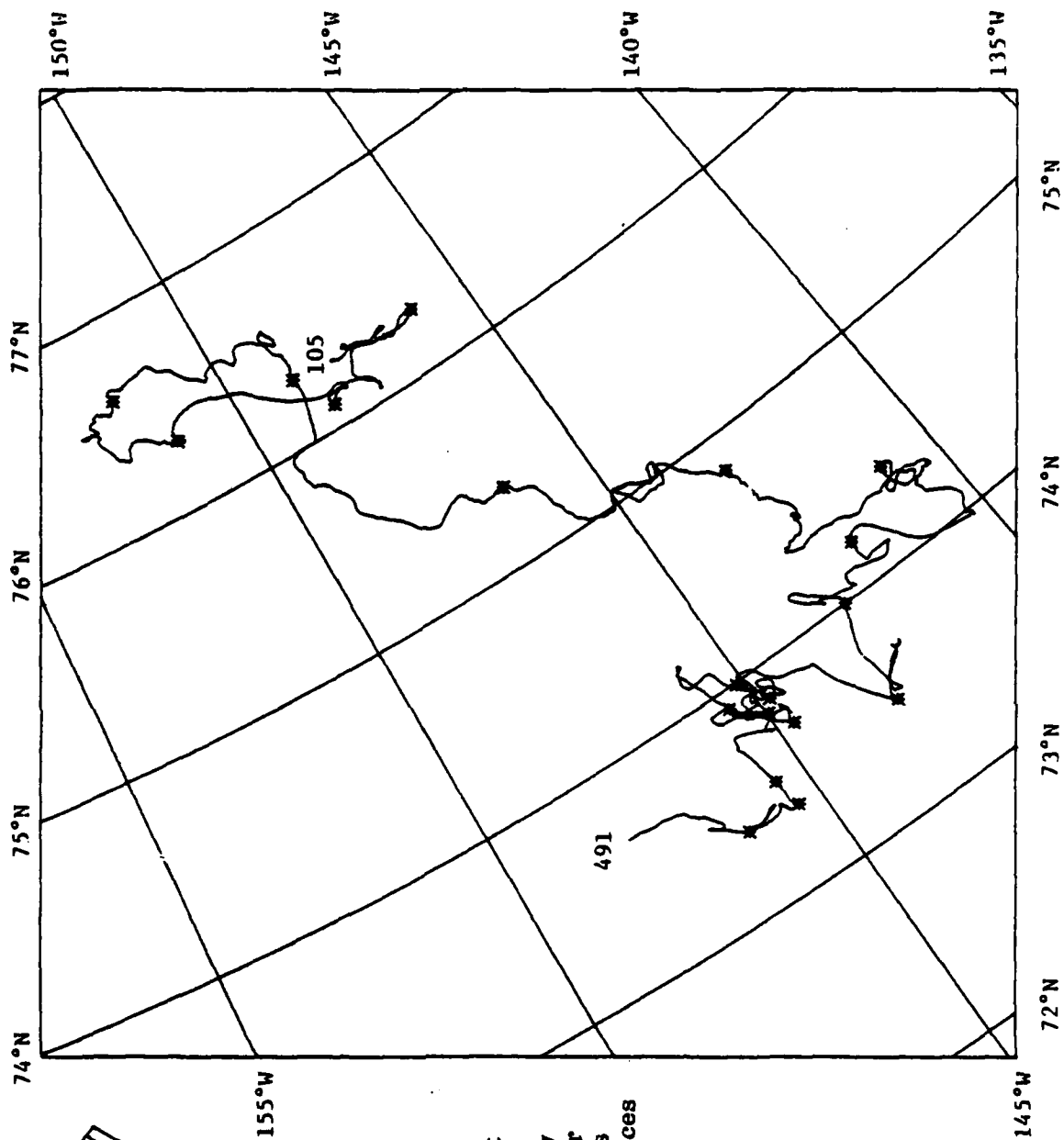


Figure 4.

Camp Snowbird

Measurements by NavSat
from 105 through 491.

This station was split by
cracks during the winter
and the NavSat antennas
were moved short distances
several times.

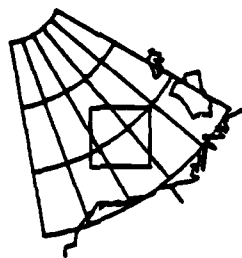
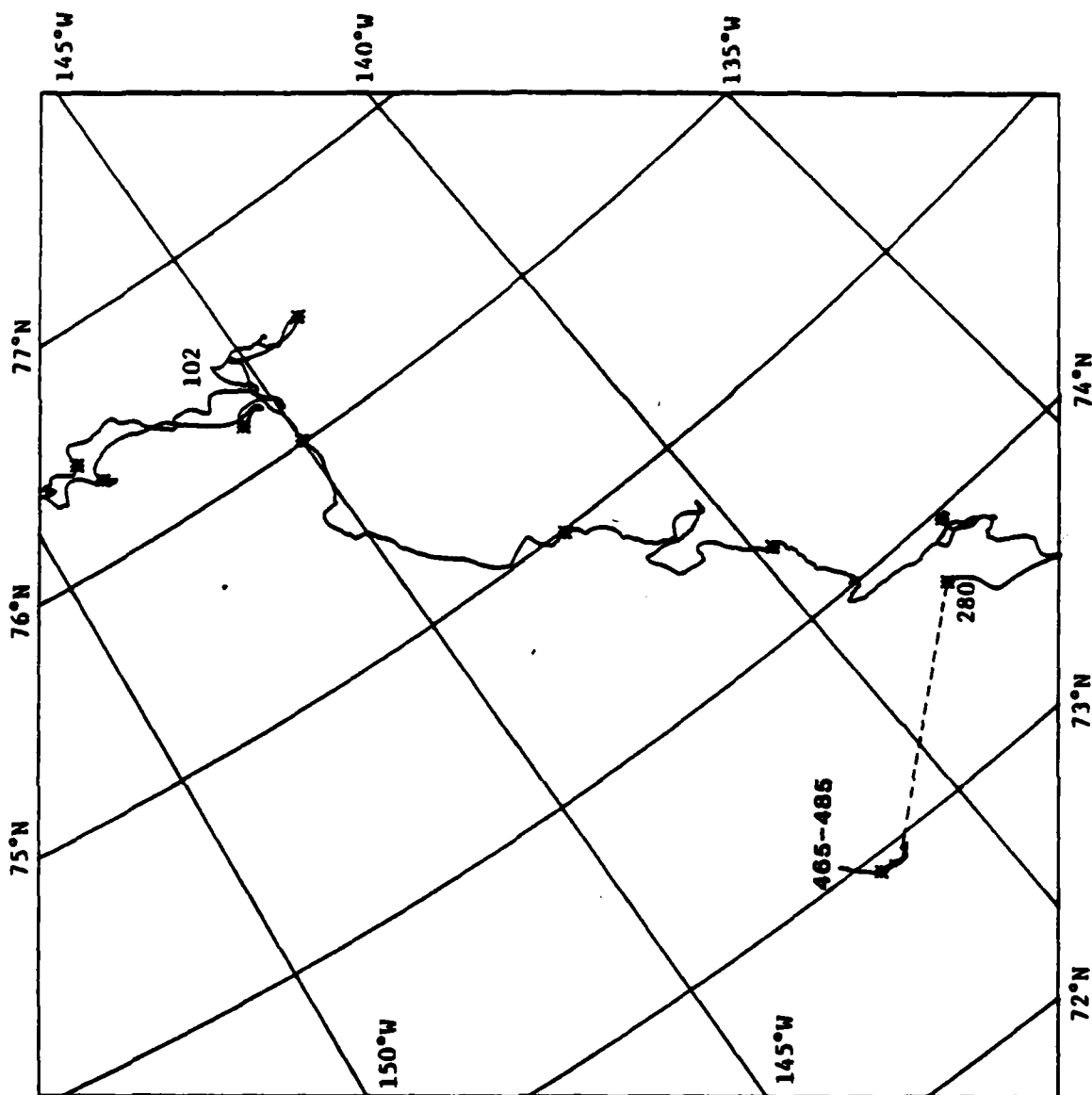


Figure 5.

Camp Big Bear

Measurements were made by NavSat beginning on day 102. On day 274 the camp was broken up by ice activity and eventually abandoned, the last data being on day 280. For a brief period in the Spring of 1976 the station was reoccupied and position measurements were made using RAMS buoy R 604, days 465-485. By this time the old camp had been spread over several kilometers.

TABLE 1
Breakdown of Profiling Current Meter Stations for Individual Camps

<u>Camp</u>	<u>Occupation Date</u>	<u>Evacuation Date</u>	<u>Total Stations Taken</u>	<u>Profiling Stations</u>	<u>Time Series Stations</u>	<u>Stations Digitized</u>
Caribou	6-Apr-75	7-May-76	404	395	9	163
	(5-Aug-75)	(22-Apr-76)				
Blue Fox	5-Apr-75	4-May-76	700	698	2	376
	(8-May-75)	(20-Apr-76)				
Snowbird	4-Apr-75	6-May-76	620	603	17	377
	(4-May-75)	(20-Apr-76)				
Big Bear	13-Mar-75	8-Oct-75	425	397	28	258
	(8-Apr-75)	(1-Oct-75)				

Note: 1) Parenthetical dates are those when PCM data collection began and ended.

2) "Stations digitized" indicate stations that had sustained speeds greater than a few cm/sec and were manually digitized for computer reduction.

The largest horizontal scale sampled by the PCM observations was the nominal 100 kilometer spacing of the manned camps, the smallest was the distance between successive casts at one camp. The maximum vertical scale sample was limited by the 200 meter depth of the profiling current meter casts. The smallest vertical scale sampled was about 10 meters and was determined by the response rate of the instrument and its rate of ascent and descent.

The AIDJEX oceanographic program maintained fixed-mast current meters of uniform type (Hydro Products) at all camps at shallow depths in the planetary boundary layer. The fixed-mast current meters at each camp were suspended on a series of rigid 3 meter, 7.5 cm diameter, PVC sections at depths of 2 and 30 meters below the base of the ice. Hourly averages pertaining to the fixed-mast current meters can be obtained through the National Oceanographic Data Center.

The directional sensors of the fixed-mast current meters were referenced to the instrument case and therefore had to be referenced to the camp azimuth to provide directions relative to true north. This was accomplished by accurately drilling the coupling holes at the ends of the PVC pipe by a lathe. When the current meter was suspended at its correct depth, the top drill hole of the pipe was then aligned to a fixed point in the camp area. A simple correction angle could then be applied to the fixed-mast data relating their direction to the camp azimuth.

Profiling instrumentation consisted of a Tsurumi-Seiki Co., Ltd. (TSK) underwater unit with a Savonius rotor, directional vane and pressure sensor. The unit was raised and lowered at 5 meters per minute by an electric

winch. The rate was chosen after several experiments to determine rotor response with different axial velocities. Current direction in this instrument was referenced to an internal magnetic compass. The direction vane follower and compass were both operated on the "light encoding disk" principle and were therefore not subject to unnecessary drag caused by the usual wiper arm friction. Low bearing friction and viscosity of the fluid surrounding the compass were the only components of drag on the directional system. This is an important factor since the horizontal component of the earth's magnetic field is so weak at these high latitudes.

Data from the PCM were simultaneously recorded on an analog chart recorder with speed, direction and depth versus time and on the AIDJEX digital data logging system (DDL). The data pertaining to the fixed-mast current meters were also recorded on the AIDJEX DDL system as well as on a multipoint recorder. The scan rate of the DDL (30 seconds) was acceptable for sensors obtaining long time series such as the fixed-mast current meters, but was not fast enough for the rapidly changing signals of the PCM.

Magnetic declination was measured one or more times each day at all the camps. These measurements were calculated by a relationship between the true and magnetic bearings of the camp azimuth. The camp azimuth was defined as an imaginary directed line passing through the A and B antennas of the satellite navigation system. The bearing of the camp azimuth, as related to true north, was determined by sun shots taken by the meteorologists. The magnetic bearing was obtained using an accurate surveyors compass placed directly in line with the camp azimuth. Magnetic declinations taken in this manner were good to plus or minus one-half a degree.

A total of 2084 PCM stations were obtained at the four camps over the yearlong duration of the program, each station consisting of an uptrace and downtrace. Of these, 1174 stations were useable. Stations that were not acceptable had relative currents that were below the threshold velocity of the instrument (approximately 5 cm/sec). Table 1 shows the breakdown of the total stations at each of the camps with those used in the final data reports. A listing of all the stations taken at the camp along with other associated parameters (dates, position, ...) is reported under the section "PCM STATION LISTING."

PCM RELIABILITY

Generally, all of the stations that have been processed show good coherence between the uptrace and downtrace of the relative velocity profiles on the scale of 10 meters or more. In many cases, the short wavelength structures can be followed from one station to the next. No spectral studies have, as of yet, been completed on the data to statistically confirm these observations. It appears, however, that repeatability of the data is very good on the scale of 20 meters and greater.

Similarity of directional tracking between the down and uptraces was rather good provided that the current speed was greater than 5 cm/sec. As the speed increased, the tracking of direction became very uniform as can be seen during any of the stations where rapid currents or eddies were observed. Below the velocity of 5 cm/sec, the directional vane oscillates widely and the coherence between traces falls off rapidly.

The one major problem associated with the PCM at all of the camps was the sluggishness of the Savonius rotor when compared with the Savonius rotors of the higher quality Hydro Products fixed-mast meters. We feel that this problem, since it was observed at all of the camps, was inherent in the design of the rotor system itself and was most likely due to bearing drag. Because of this problem of velocity data being less than suggested manufacturers' limits, great care was taken from the beginning to calibrate the PCM velocity readings at every station against the more accurate velocity readings of the 30 meter fixed-mast sensor. Experience from a number of investigators has shown that Savonius rotors with free bearings and uniform manufacture do

not need individual tank testing. A universal calibration curve may be used as was done for the Hydro Products meters. The Hydro Products Savonius rotor units had exceptionally good bearings and were used for calibration. The velocity of the 30 meter fixed-mast sensor and the velocity reading of the PCM were recorded at the instant that the two sensors were at the same depth level during each cast.

Calibration of the PCM velocity sensor was accomplished by linear regression between the PCM and 30 meter velocity readings over fairly large blocks of time (10 to 20 days). The blocks were separated into up and down-traces due to the presence of a hysteresis effect caused by the raising and lowering of the PCM through a current. In effect, a higher velocity would be recorded at any one level on the uptrace because of the sensor being pulled through the current. The opposite would be true for the downtrace. Large data blocks were used in the calibration procedure in order to (1) obtain enough data points over a wide range of speeds, and (2) average out random noise due to turbulence and/or human recording errors.

The mean coefficient of determination was calculated to be 0.87 with a standard deviation of 0.08. This indicates a high degree of correlation between the two Savonius rotors. Figure 6 shows a typical regression diagram used in the calibration of the speed sensor at camp Big Bear.

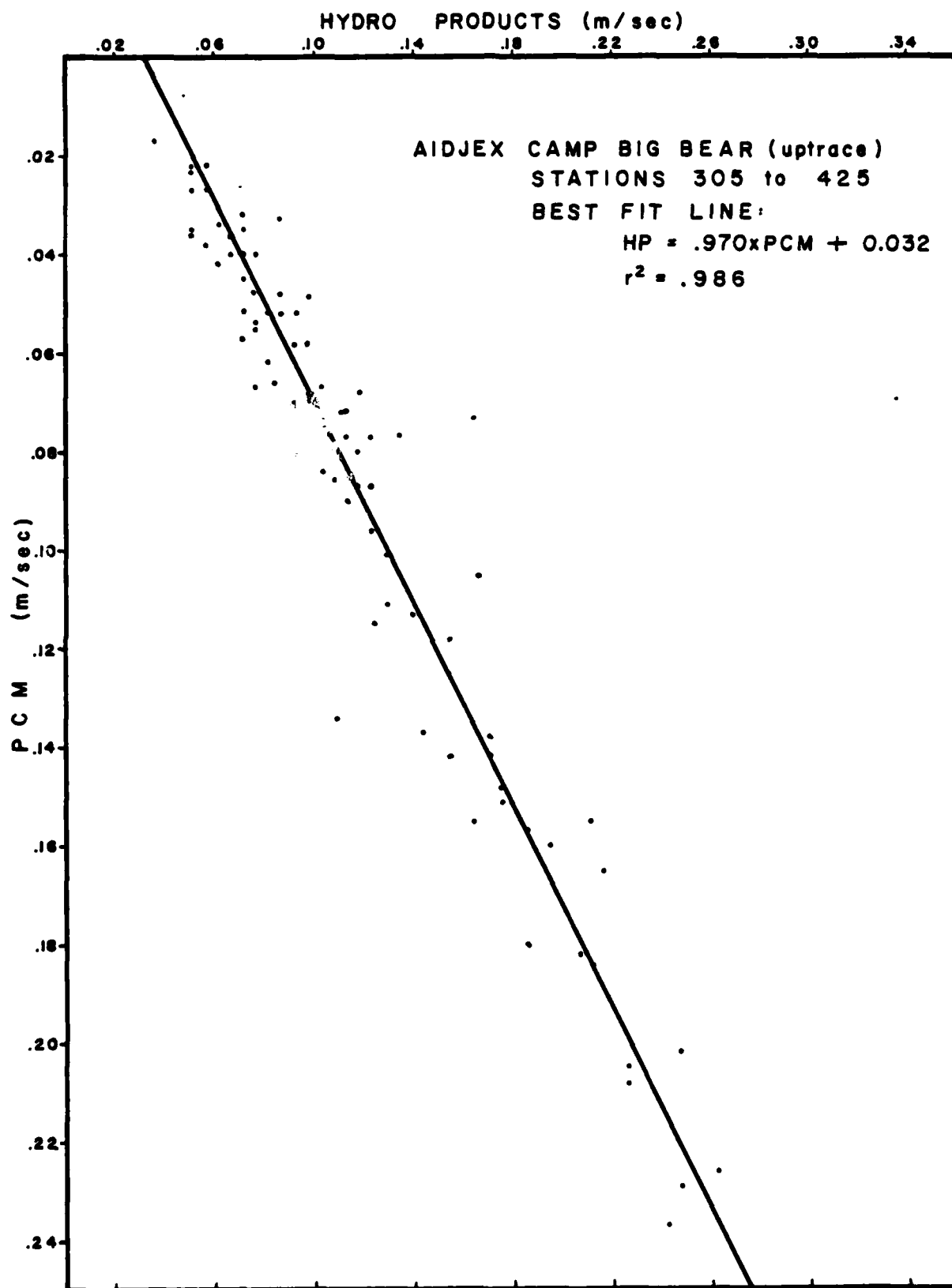


Figure 6. Linear regression diagram taken from a segment in the speed calibration from camp Big Bear.

INITIAL DATA REDUCTION

In addition to the calibration of the raw velocity data of the PCM, directional calibration, values for magnetic declination through time, and digitized card decks of the analog data had to be obtained before reduction could begin.

The PCM deck unit produced directional output from 0 to 540 degrees. This was designed to eliminate the rapid pen oscillations (zero to full scale) commonly seen on the 0 to 360 degree outputs when the directional vane oscillates around 0 degrees. There were only two instances when rapid pen movement was observed on the analog charts. The first being a shift from 0 degrees to 360 degrees and the second being a shift from 540 degrees to 180 degrees. On the basis of these exact shift points for 0 and 540 degrees, calibration segments throughout time were made that would correct direction for any linear drifts or sudden offsets. Linear drifting of the zero and full scale settings in time were not evident or did not account significantly for changes in the calibration data. As a result, bounds of the calibration segments were chosen because of sudden offsets in the data.

Magnetic declination data were originally taken once every day at each camp and then increased to once every time a profiling current meter station was taken. Readings obtained from a surveyor's compass aligned with the camp azimuth were combined with the camp azimuth determination closest in time to determine magnetic declination. The reduction of magnetic declination information was done so as to create blocks of data points that were separated by naturally occurring breaks caused by rapid ice movement. An average

magnetic declination was then computed for each data block representing a short span in time for each camp. In these data sets, very few points fell outside a span range of 3 degrees. Magnetic declination data obtained in this manner were accurate to within the plus or minus 6 degree accuracy limits for the PCM directional system. Final magnetic declination was then used to convert original PCM directional data (referenced to magnetic north) to true direction.

Finally, the analog chart records were digitized. Generally, each station consisted of a downtrace and uptrace unless one or the other had been rejected because of insufficient current or recorder problems. The points taken for digitization on each of the output traces for speed, direction and depth were the maxima, minima and inflection points, with enough points in between to preserve the proper curvature. Digitization provides some smoothing of the data. However, data with a scale length of greater than 2 meters were not affected.

The AIDJEX digital data logger tapes were not used for PCM data reduction due to a predesigned sampling rate of the computer that was too slow for the rate at which the PCM was lowered. Excessive noise along the data transmission lines also was a main factor in not attempting to reduce the tape data for the PCM.

Due to the convention adopted by the AIDJEX staff and other institutions responsible for the reduction of data taken during the main AIDJEX experiment, time was converted to a Julian calendar system with day 1 = 1 January 1975 and ending with day 500 = 4 May 1976. Throughout this data report, time in AIDJEX days is frequently cited. A list of the AIDJEX days versus the normal Gregorian system was tabulated in Appendix 3.

COMPUTER REDUCTION

Computer reduction involved quality control and calibration of the relative traces. The final product was absolute velocity consisting of speed and direction at one meter intervals to the maximum depth of the station. The flow diagram shown in Figure 7 indicates the sequence of operations used to produce the absolute data.

Once a large block of digitized data, consisting of up and down traces was completed, several quality control programs were run on the data. These programs checked for various mechanical and operator errors. After all problems were removed from the digitized decks, they were stored permanently in computer files.

Relative data were then produced for the individual up and down traces for all stations. Velocity and directional corrections were applied to the data to provide calibrated speed referenced to the Hydro Products 30 meter fixed-mast sensor and correction for directional offset and full scale parameters. Direction at this point in the processing was relative to true north by the addition of magnetic declination. The data set being produced consisted of individual traces with speed and direction at one meter intervals.

As reduction of the data proceeded, it became apparent that there were frequent, rapid 360 degree directional rotations and corresponding fluctuations in speed which were caused by the instrument (Figure 8). This feature appeared to be inconsistent with, or entirely absent from, the associated up or downtrace for a given station. Further investigation of this feature showed it to be an artifact induced into the analog records by a rapid

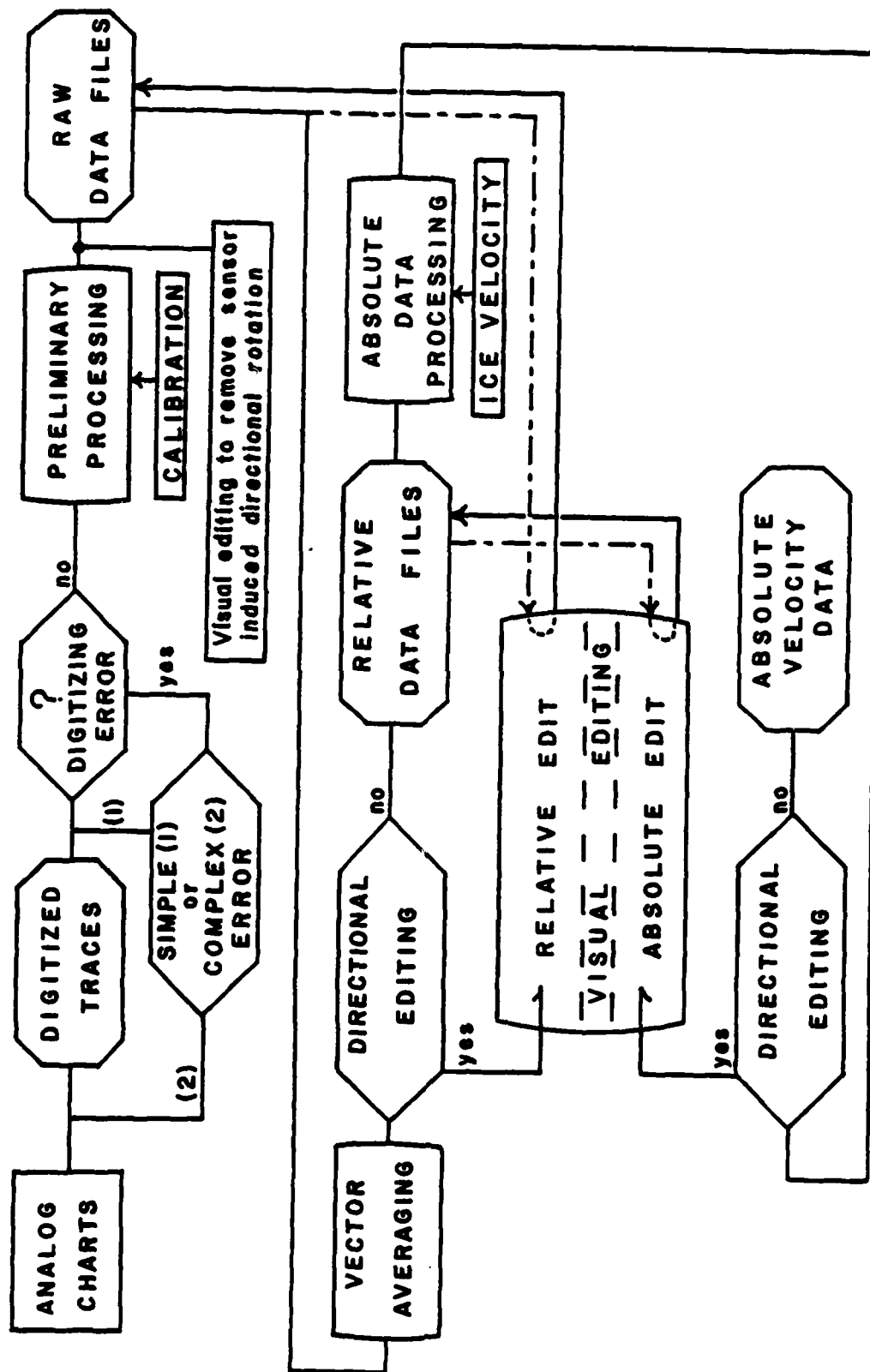


Figure 7. Flow diagram indicating the process by which absolute velocity data are obtained. Dashed line with arrow indicates the file necessary for editing. Solid line with arrow indicates where final edited data are returned.

spinning of the sensor package. The reason for the rotation of the sensor is believed to be a rapid untwisting of the stiff electrical cable after it had been slowly turned by hydrodynamic forces acting on the slight asymmetries of the instrument package.

Even though the direction system of the PCM was independent of the instrument package, the viscosity of the fluid surrounding the compass provided enough friction to partially rotate it along with the instrument housing.

Approximately 70 percent of the analog traces had been digitized by the time this feature had been recognized as an instrument-induced signal. Nearly half of these digitized traces were associated with one or more of the directional features. The remaining analog traces requiring digitization had the rapid directional rotation and associated speed fluctuation removed manually. This was accomplished by supplying a visual best fit curve to the valid data before and after the deleted segment.

Due to the large portion of digitized analog traces that included this rapid directional rotation, a visual editing program was created to remove them. The editing program graphically displayed any uptrace or downtrace found by the operator to contain one of these rotational features. The operator then chose the upper and lower depth limits of the feature that was to be deleted. A least squares best fit cubic equation was then calculated using three points preceding the upper depth limit and three points following the lower depth limit. In the special cases where the directional rotation began at the start of the trace or concluded at the end of the trace, so there was no leading or succeeding three points, an average of the three points present was used to

fill in the deleted section. Figures 8 and 9 show an example of the editing procedure of the program using a before and after profile of a station with one of the rotational features.

The uptrace and downtrace were combined, by vector averaging, to provide a single relative velocity profile. Speed and direction of the two traces were converted to north and east components. After the averaging of the individual components at one depth level, they were reconverted to speed and direction.

The hysteresis effect was effectively eliminated by the addition of the two traces. In several cases where only one trace existed for a station, the profile was not altered to remove the hysteresis.

Vector averaging was preferred over arithmetic averaging of the traces because of an added advantage during low speed addition. As previously mentioned, directional coherence falls off rapidly as the speed approaches the threshold velocity of the instrument. When combining the two traces, it was preferable that the greater velocity observed would have more weight in determining the final output at that depth level.

Vector averaging did possess its own inherent difficulties. The majority of these problems were confined to low velocity addition. When the traces to be added were significantly different in directions at the same depth level (due to low directional coherence at low speeds), erratic directional oscillations or rapid shifts in direction would result when the vectors from both traces would alternate dominance and thereby change the final output more to the direction of the dominant vector. These shifts would sometime attain a directional shear of 180 degrees per meter.

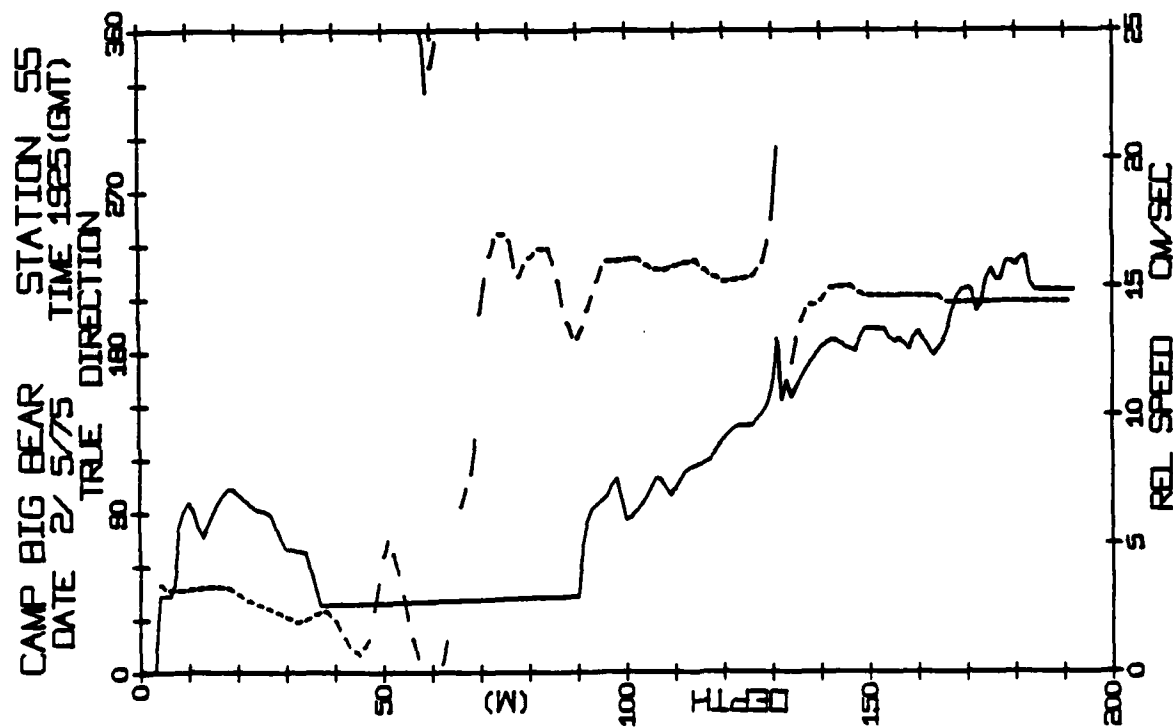


Figure 8. Typical example of a 360 degree directional rotation caused by the sensor package being spun.

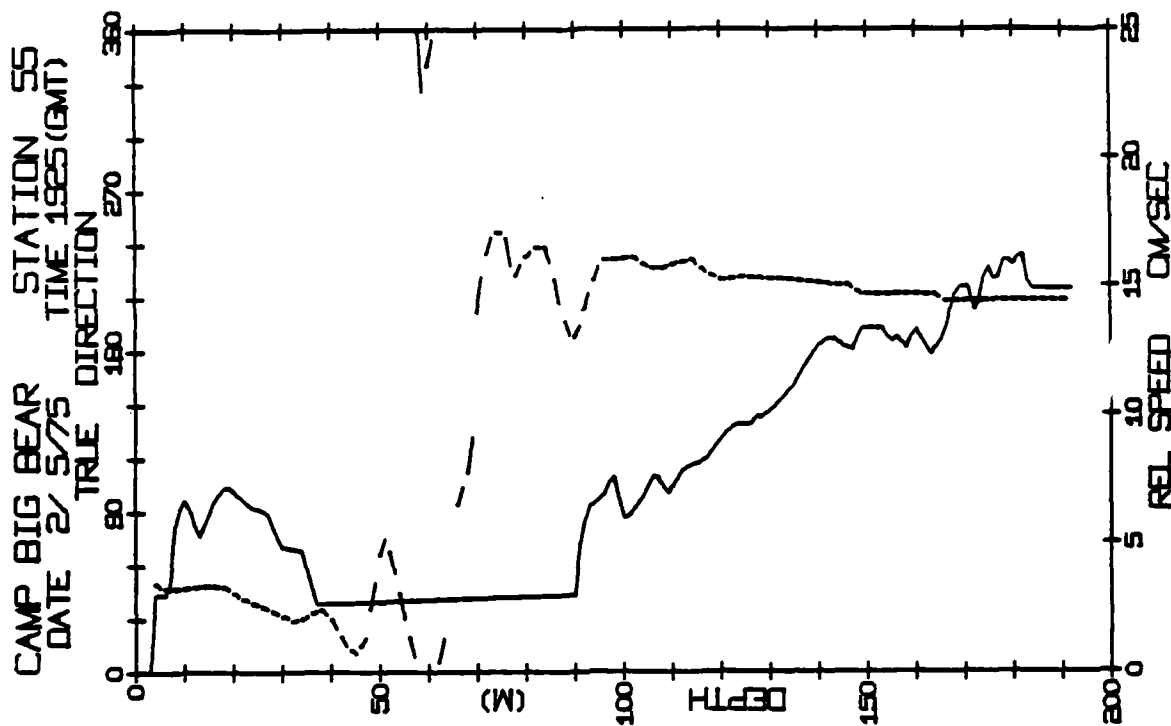


Figure 9. Same plot as Figure 8, but after being visually edited to remove 360° rotation.

The remainder of the cases providing the erratic directional output were due to a rapid increase in speed (within a few meters) resulting from the Savonius rotor attaining or passing its threshold velocity after being motionless for some period of time. As before, if directions were significantly different, an increase in speed would sometimes change dominance from one trace to another, thereby providing rapid directional shifts.

Both of these problems, for the most part, were removed without any major difficulty. This was accomplished by visually editing the section of the trace causing the erratic directional output. Editing was done in the same manner used to remove the sensor-induced rotational spikes. It should be noted that the editing of the traces was not designed to eliminate the sense of the rapid shift in direction, but rather to smooth the shift out to a more realistic rate of change of direction. In general, rapid directional shifts with a rate of change of direction less than 30 degrees per meter were left untouched. For consistency throughout the data set, only one person familiar with this particular problem was used in the editing process. It was felt that this provided as much continuity as possible in the decision making from station to station and from camp to camp. Several stations from a few of the camps were eliminated all together from the data set because necessary editing would have been too severe.

Before the editing of the relative data was to commence, an attempt was made to reduce the amount of visual editing by removing all relative speeds and their associated directions less than or equal to 5 cm/sec from the data set. This, however, turned out to be impractical because the total amount of relative data lost would have been on the order of 30%, as compared to the 1% - 2%

that was to be edited. Another problem was the loss in continuity of speed and direction in a profile every time a block of data less than 5cm/sec was removed.

Finally, absolute velocities were computed by vectorially adding ice velocities to the relative data.

Obtaining estimates for the position and ice velocity for a particular station is given in greater detail in the section entitled "Interpolated Position and Ice Velocity." Briefly, two cubic equations (related to latitude and longitude) are uniquely defined by the satellite navigation data sets directly preceding and following the point in time related to the station. Each satellite navigation set consists of the position (latitude and longitude), ice velocity (north and east components) and the time of observation. Introduction of the time of the station into the two cubic equations provides the latitude and longitude of the station. North and east ice velocities are calculated using the first time derivatives of the latitude and longitude equations respectively at the time of the station.

Estimates (95% confidence limit) of the errors associated with latitude, longitude, north and east ice velocities are also provided at the same time. If the error estimates were too severe, the station in question was then removed from the absolute data set.

Any data obtained while the sensor was in the hydro-hole were removed. Ice thickness at the hydro-holes is indicated in Table 2. The first data point to be kept as viable data was at the first integral depth value past the bottom depth of the hydro-hole. Any data reported in the hydro-hole

were given default values for speed and direction. The default values being 0.0 cm/sec and 999.9 degrees respectively.

TABLE 2

<u>Camp</u>	<u>Ice Depth Below Sea Level at Hydro-hole (cm)</u>
Caribou	300
Blue Fox	470
Snowbird	340
Big Bear	250

Vector addition still proved to be a problem in a small percentage of the total number of data points. This problem was very similar to the difficulties encountered during the low velocity vector averaging of the up and downtraces, the only difference being that this occurred when speeds of the relative data closely matched that of the added ice velocity vector. Generally, this happened when ice velocities were low; however, problems did still exist at speeds of 15 to 20 cm/sec. Even though the final result of the addition of the ice vector to the relative data for these special cases was very similar to the low velocity vector averaging problem, the physics of the situation was not the same. The reason for the majority of the problems was a result of the PCM being pulled through a nearly motionless part of the water column (absolute speed less than 5 cm/sec). The result being a relative speed profile of the negative of the ice velocity vector while the sensor was in that particular part of the water column. Upon the addition of the ice velocity vector

to the relative data, resultants are going to be very small and for the most part directions will have very high shears attaining 180 degrees per meter.

Consider the example where two relative velocity vectors separated by 1 meter in depth are being added to the ice velocity. Both vectors are nearly opposite to the ice vector, however one of the relative vectors is less than the speed of the ice and the other having a magnitude greater than that of the ice. The result of the addition would be two successive small amplitude absolute velocity vectors, each being out of phase with the other by approximately 180 degrees.

Visual editing of the relative data was again employed to remove the extreme directional shears from the absolute velocity profiles. There was, however, one major difference in the editing policy, since directional shears were generally larger than those seen in the averaging process and they were due to a different situation. This procedural difference was to ignore the directional shifts at low speeds and concern ourselves with trying to provide correct decisions at the higher velocity directional shifts that would maintain the integrity of the original analog profiles. As a result of this decision, there are several profiles still possessing the high directional shears at low absolute speeds. These directions are not to be taken as fact but rather should be put in proper perspective with the directions at more reliable speeds above and below the affected segment.

INTERPOLATED POSITION AND ICE VELOCITY

Filtered and smoothed estimates for position and velocity through time were recently updated for all of the AIDJEX 1975-76 manned camps (Thorndike and Manley, 1980) to provide better resolution for inertial oscillations of the ice motion. The initial Satellite Navigation report (Thorndike and Cheung, 1977) indicated signal reduction in the data at the inertial period due to filtering of approximately 50% and was therefore not acceptable for the reduction of certain parts of the oceanographic data set.

Positional estimates were not regularly spaced in time nor were they at the times when the STD or PCM stations were started. Therefore it was necessary that some software routine be constructed in order to give reliable estimates of the position and ice velocity at the times of the stations in question.

Normally, 25 - 30 position fixes were recorded per day at each of the four camps. The maximum number of fixes per day was close to sixty, and the minimum was zero for a period of approximately five days. With these wide variations in the spacing of the data, it became important to estimate the standard error associated with the calculated positions and velocities. These error estimates would then later become useful in the determination of the station's relative importance for a particular application. Typical examples would be the rejection of an STD station (position error of 1000 m) intended to be used in a geostrophic calculation where the inter-station spacing is on the order of 2 kilometers, or relative velocity PCM stations being rejected for absolute data processing when the ice velocity error was exceedingly high. Regardless of the intended application, error estimates for both position and velocity are an integral part of the data set.

There are several methods to determine the position of a given camp at a particular time, given precise estimates of the position and velocity before and after the time in question. The methods range from a simple approach of choosing the position fix closest in time to the station in question, to more involved interpolation schemes.

Due to the presence of small to intermediate scale structures observed in the AIDJEX oceanographic data set, precise position and ice velocity estimates were required to resolve them as best possible. By defining a smooth and continuous time dependent function $X(t)$, of a positional parameter such as latitude or longitude, four boundary conditions were initially provided by the navigation data set. These known conditions were: $X(t_1)$, $X(t_2)$, $X'(t_1)$ and $X'(t_2)$. In order for the function $X(t)$ to be uniquely defined, $X(t)$ by definition must be cubic.

Once the time of the station was provided, cubic equations for both latitude and longitude were defined using the navigation points directly before and after the station time in question. Position and ice velocity were then obtained by substituting the time of the station into the cubic equations and their first derivatives. North and east ice velocities being defined as the first time derivative of latitude and longitude respectively.

ERROR ESTIMATES FOR INTERPOLATED POSITION AND VELOCITY

Error estimates for the parameters of latitude, longitude, north and east ice velocities were broken into two time blocks consisting of summer and winter data. This was done to take into account the more uniform movement of the ice during the winter and the more variable movement in the summer due to the presence of more open water and higher amplitude inertial oscillations. The summer block consists of the data between 1 July 1975 (day 182) and 30 September 1975 (day 273). All data outside the summer segment comprised the winter block. The breaking points in time were chosen on the basis of the presence or lack of high amplitude inertial oscillations using the entire plotted data set of ice velocities (Thorndike and Cheung, 1977) of which Figures 10 and 11 are only a part. A major part of the summer data showing the increased presence of high amplitude inertial oscillations can be seen in part of Figure 10. In Figure 11, which comprises part of the winter data block, there is a marked damping of inertial oscillations, showing amplitudes less than a few cm/sec (days 409-422; 13-26 February 1976).

Errors were then calculated with the use of the Navigational data set. The general processing system would be to take three sets of points from the navigation data set, at times $T_1 < T_u < T_2$, each set containing latitude, longitude, north and east ice velocity and the time of observation, T_1 , T_u and T_2 defined as follows:

- T_u = time of the "unknown"
- T_1 = time of first bounding data set
- T_2 = time of second bounding data set

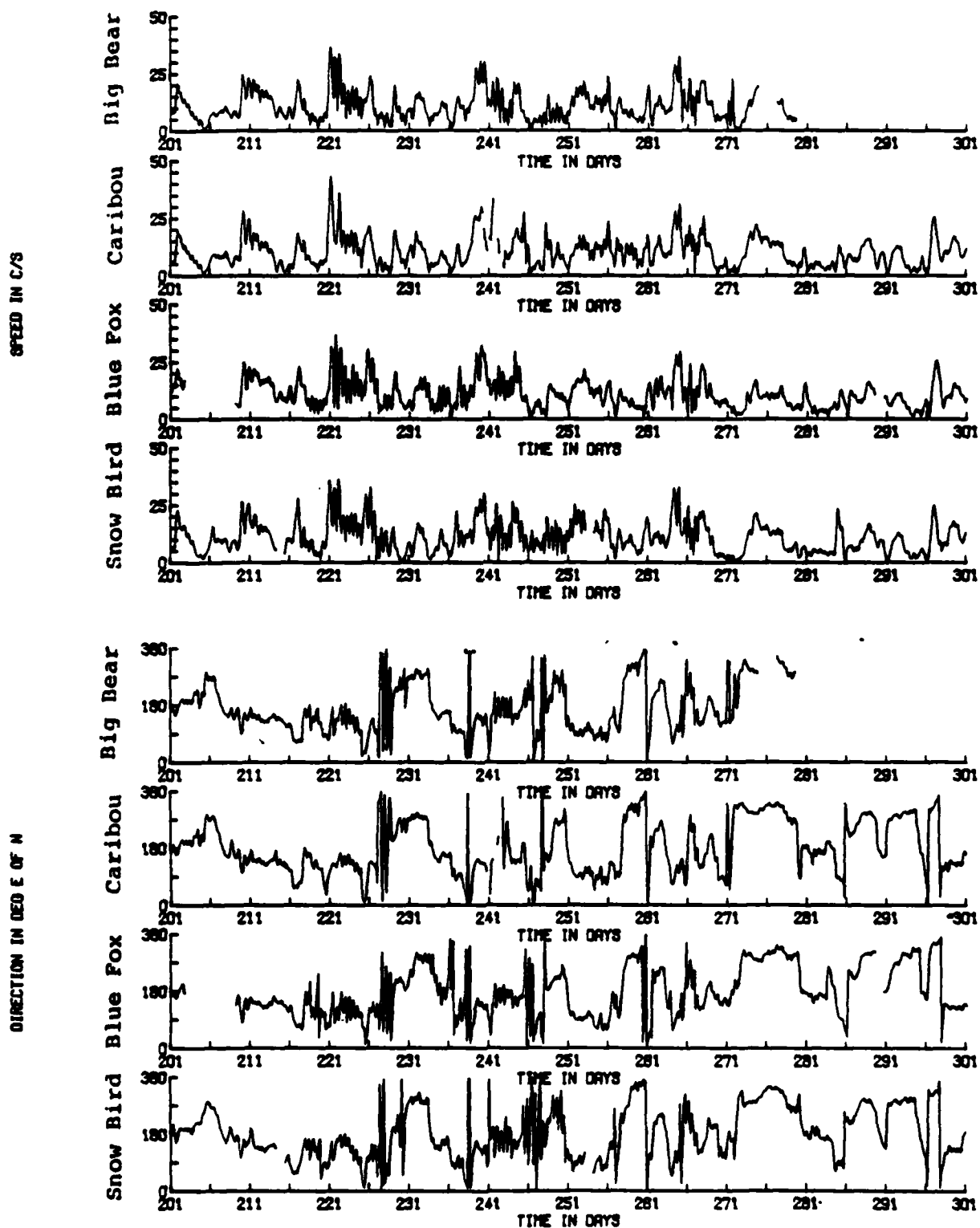


Figure 10. Speed and direction plotted for the manned AIDJEX camps, days 201 to 301.

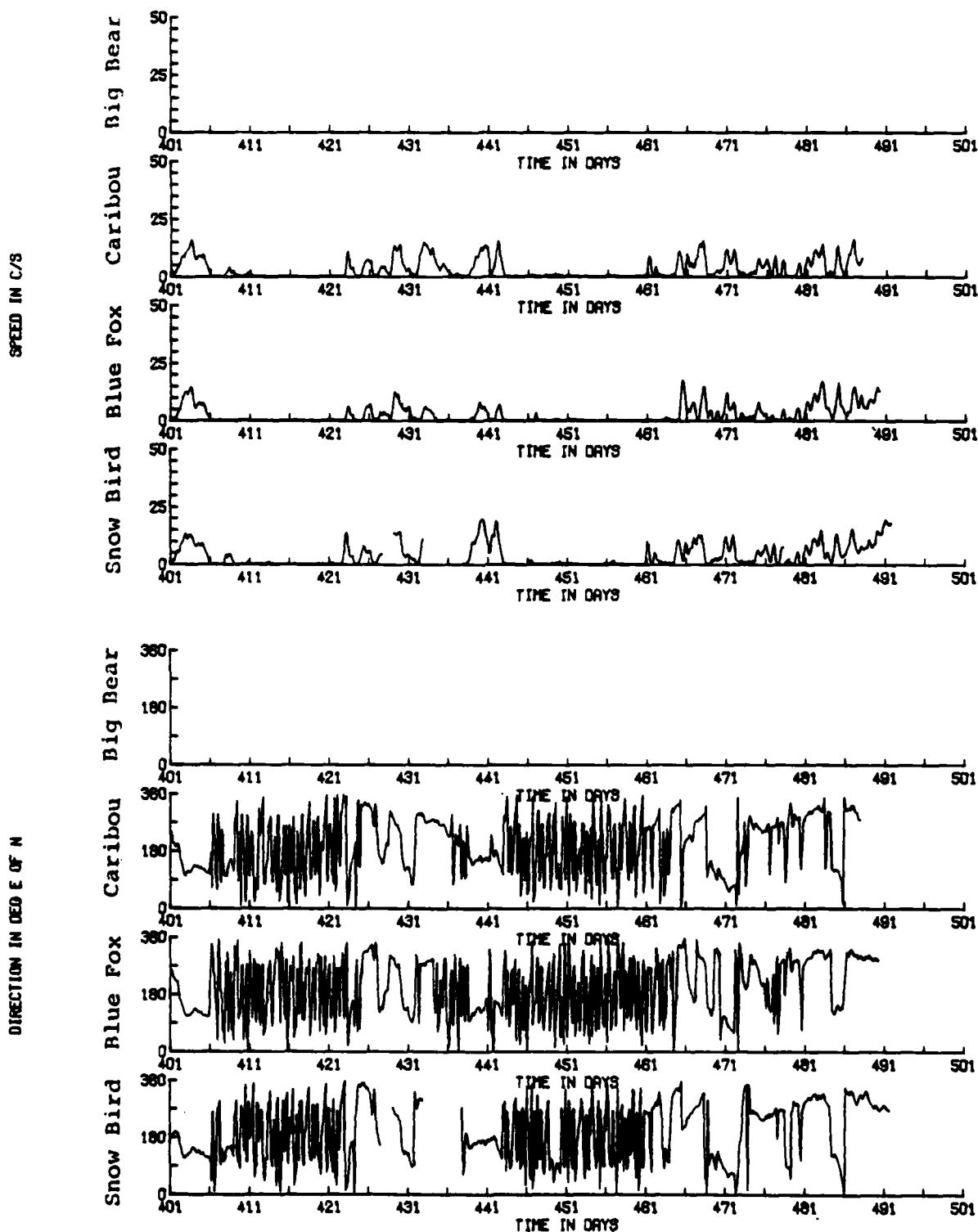


Figure 11. Speed and direction plotted for the manned AIDJEX camps, days 401 to 501.

The first and third sets of data define the boundary conditions upon which to formulate the cubic equations. The equations were then solved for the latitude, longitude, north and east velocity at the time of the second navigation set. Errors were then calculated by finding the absolute difference between the estimated (cubic) and known (navigational) parameters. The resulting errors for the four parameters were stored and statistically analyzed at a later time.

The errors were analyzed to determine their dependence on the times T1, Tu, and T2. If the bounding sets were separated by a relatively short span of time, regardless of where the "unknown" is within the time bounds, the errors for all four parameters are bound to be very small. On the other hand, if the bounding sets are separated by a large time span, then it becomes important to know where the "unknown" is located within the time bounds. As the time of the "unknown" approaches either of the bounding sets, errors are again going to be low. The same would be true for the reverse, i.e., as the "unknown" reaches a time point roughly in the center of the bounding sets, the errors should correspondingly get larger. Because of this, a time ratio was calculated and stored with the errors made for a particular point in time. The time ratio was defined to be the absolute difference in time between the first bounding set and the "unknown" divided by the time difference of the two bounding sets. This would be written as:

$$\text{Time Ratio} = R_t = (T_u - T_1) / (T_2 - T_1) \quad (1)$$

$$\text{Time Difference} = D_t = T_2 - T_1 \quad (2)$$

Roughly 1200 "unknowns" were computed for specified maximum time differences. The maximum time difference being the time difference between the bounding data sets. Maximum time differences were confined to specific limits, those being from 1-2 hours, 3-4 hours, 6-7 hours, 11-13 hours, 23-25 hours, and 47-49 hours. Each of these runs was computed for the summer as well as the winter block, thus making 12 runs total. Each run computed better than 4800 errors for the four parameters in question.

Data were then stored as to time ratio and plotted for each run and parameter as shown in Figures 12, 13, 14 and 15. These figures show the errors from the 11-13 hour run for the winter time block at camp Blue Fox, each figure being one of the error parameters.

A sliding t-distribution of 30 points (95% confidence limit) was run on each of the data sets to provide a statistical upper limit below which 95% of the original data would fall. A least squares best fit quartic equation was then computed for the 95% confidence limit points. The quartic equation was chosen because of its ability to fit the data more closely at the time ratios of 0.0 and 1.0. Quadratic and cubic equations would tend to provide excessive negative error approximations as the bounding ratios were approached. Figures 16, 17, 18 and 19 represent the 95% confidence limit points and corresponding best fit equation resulting from the original data sets shown in Figures 12-15.

It has already been estimated that the error estimate (Ee) is defined to be a function of two parameters as stated in equation 3.

$$Ee = F(Dt, Rt) \quad (3)$$

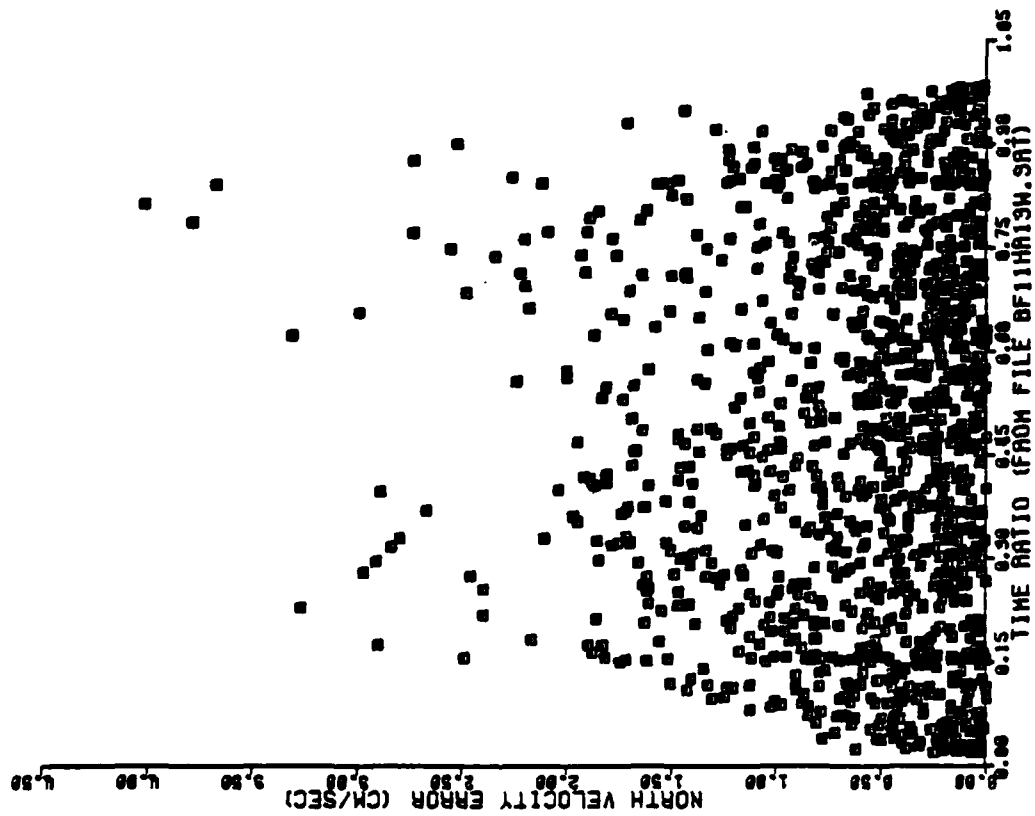


Figure 14. See text for more complete description.

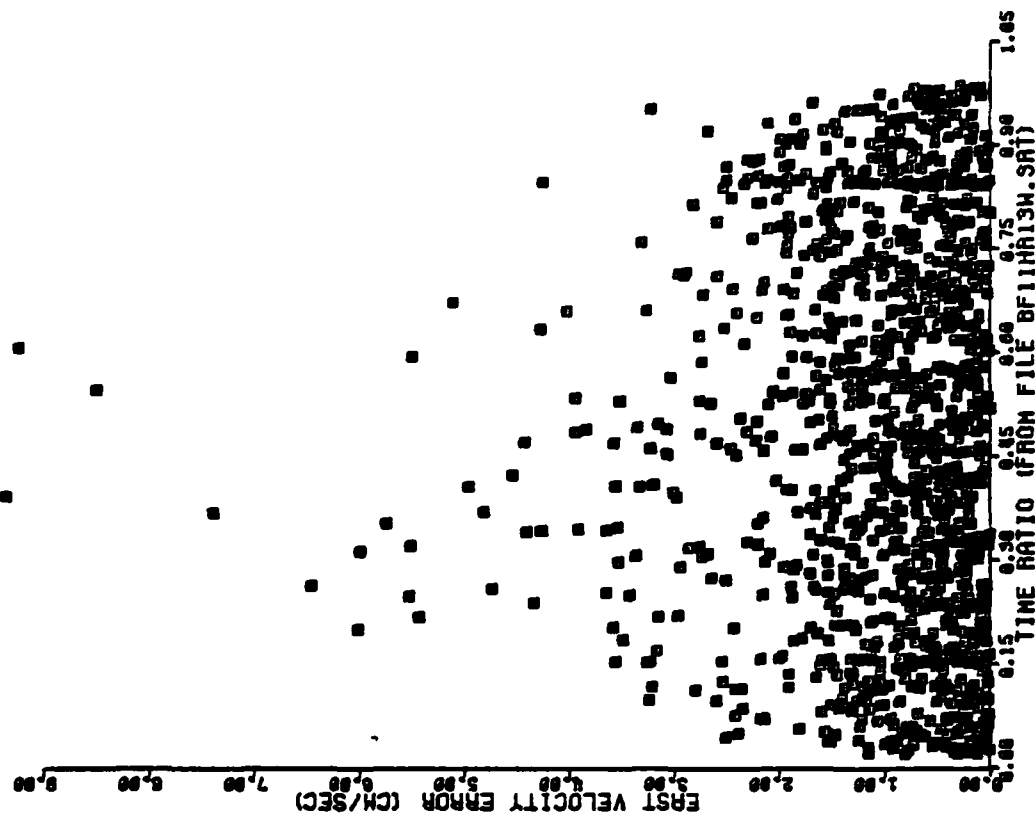


Figure 15. See text for more complete description.

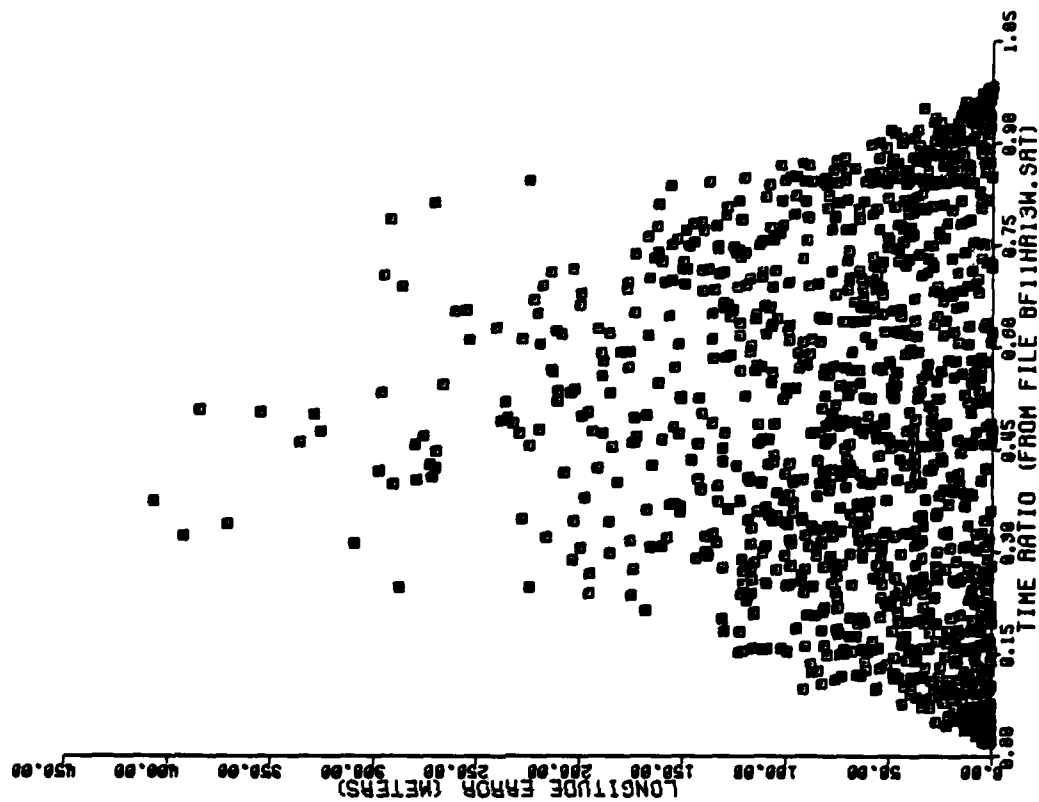


Figure 12. See text for more complete description.

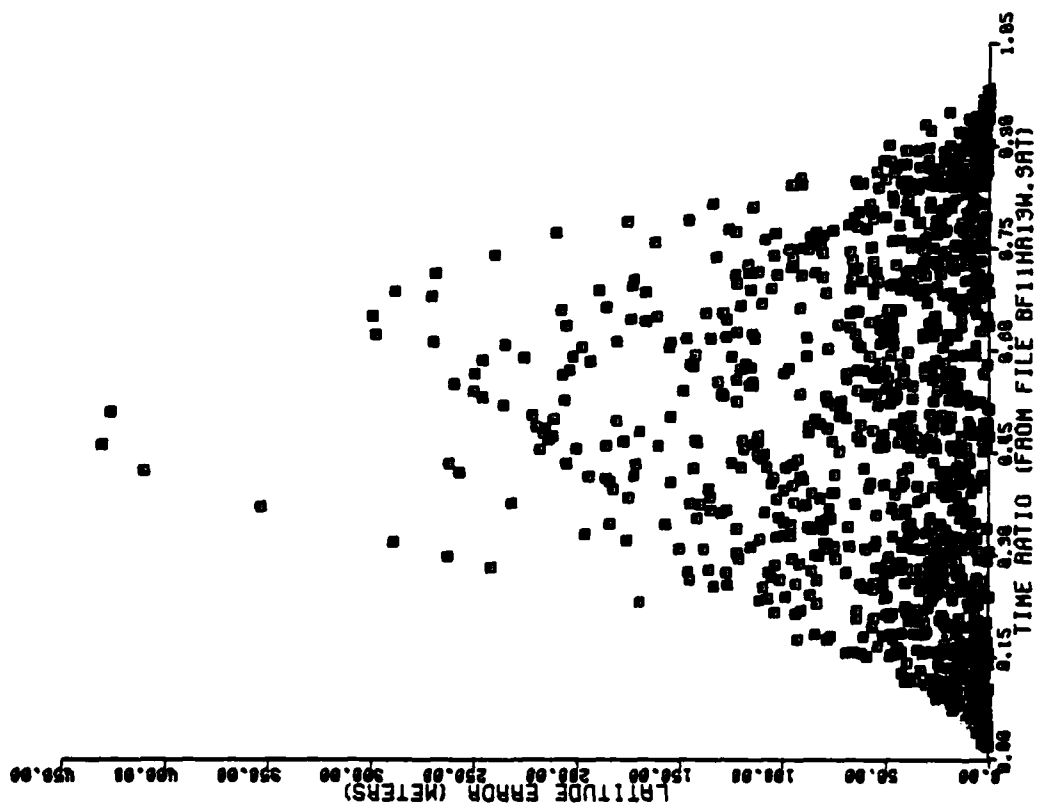


Figure 13. See text for more complete description.

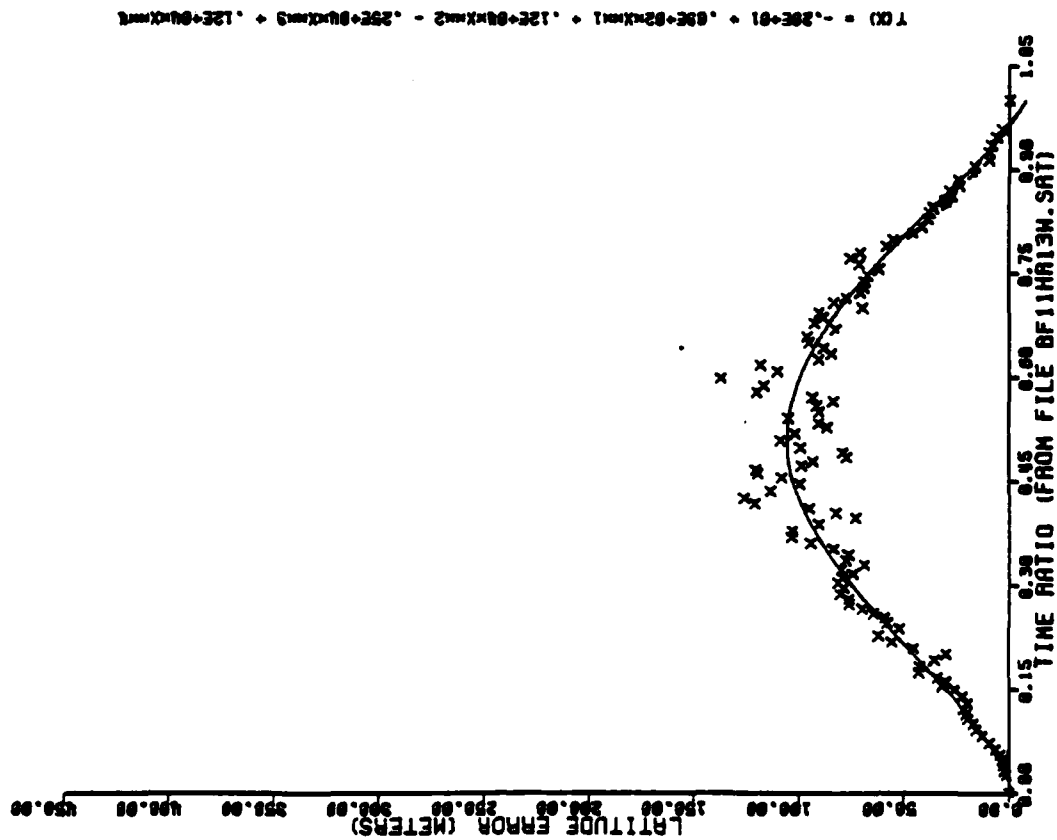


Figure 16. See text for more complete description.

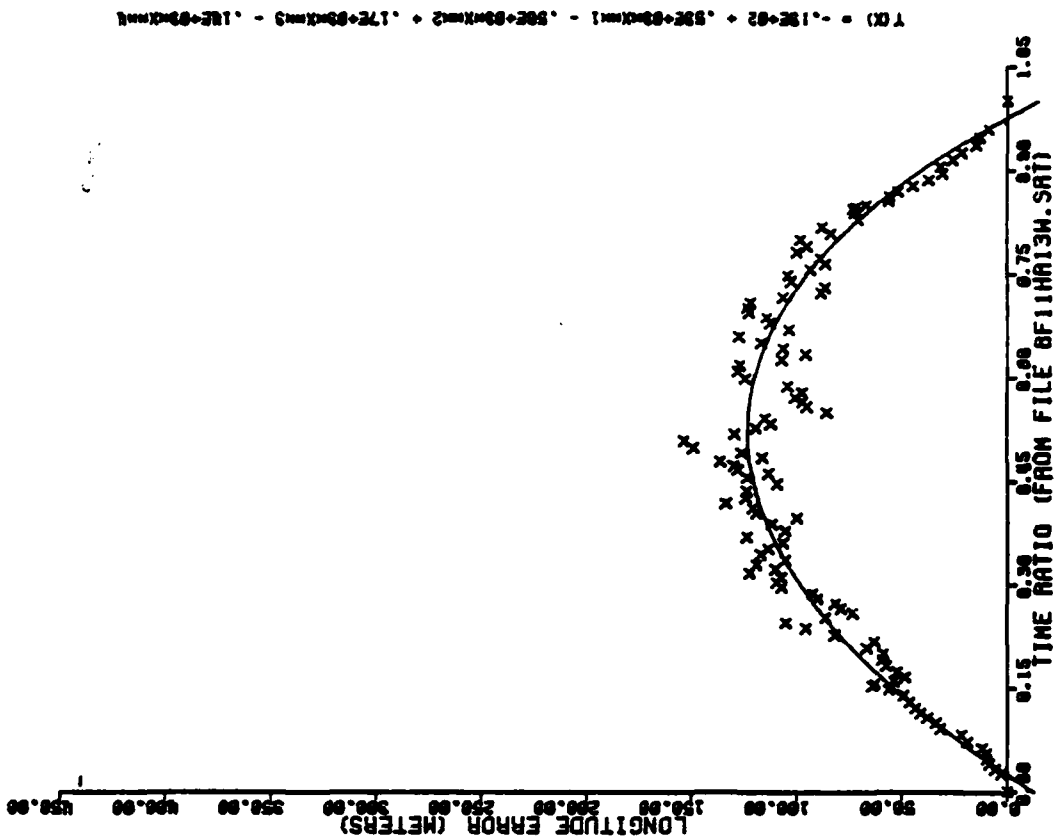


Figure 17. See text for more complete description.

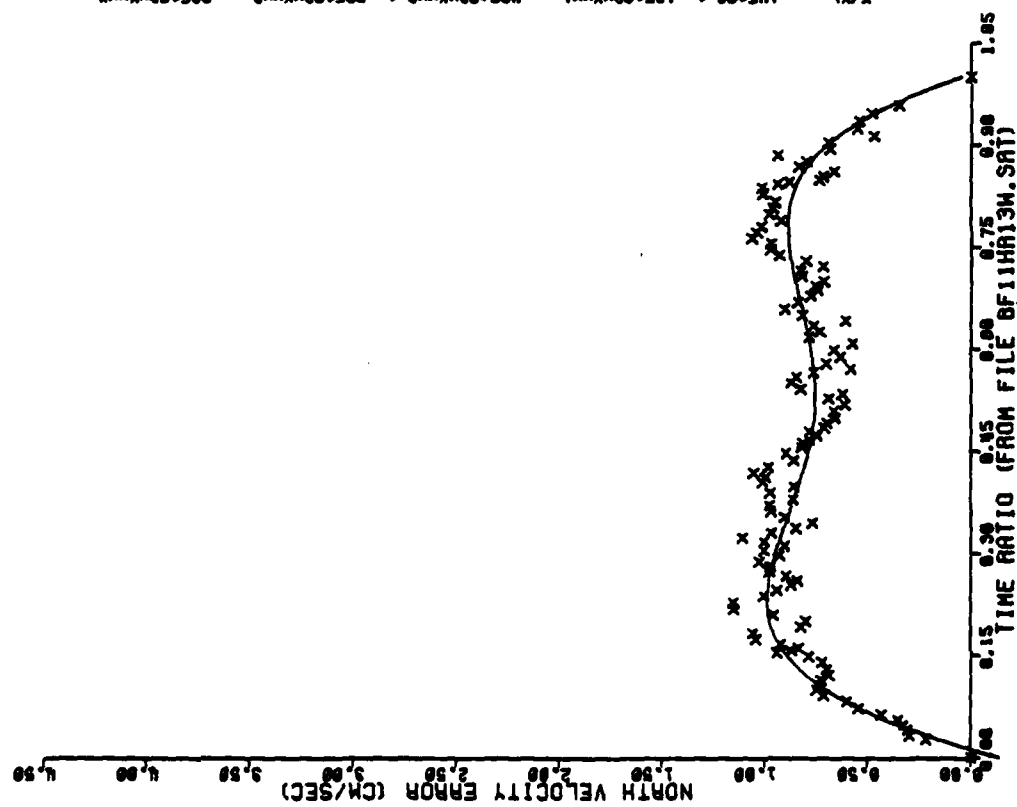


Figure 18. See text for more complete description.

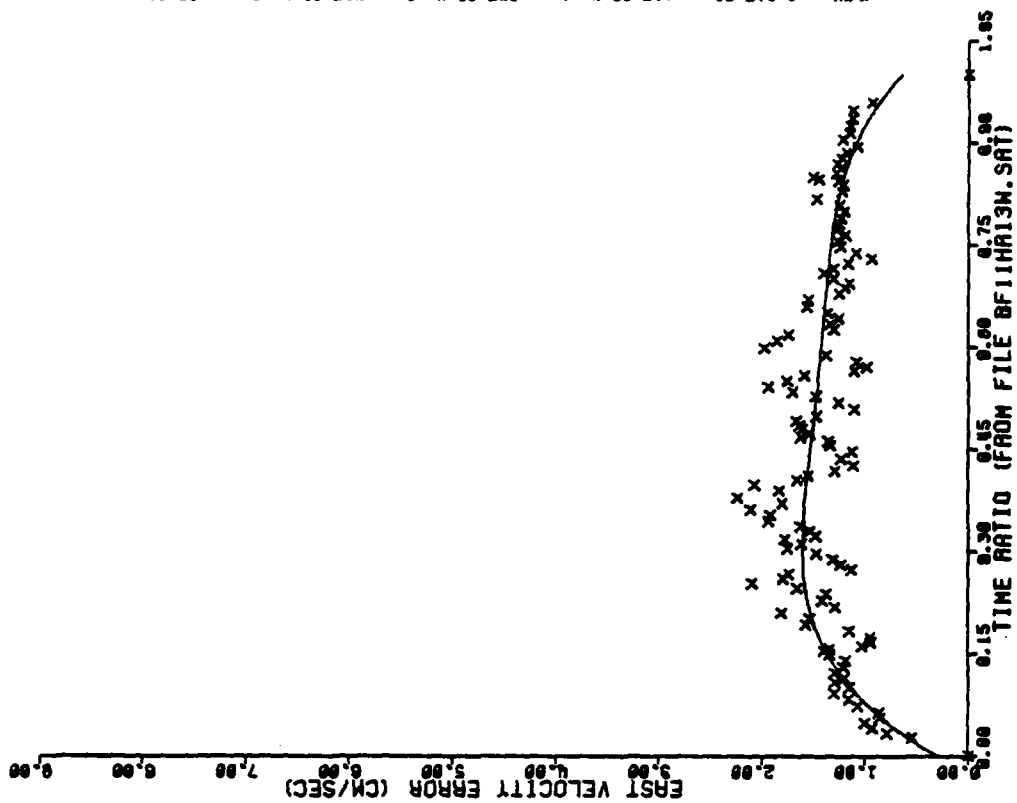


Figure 19. See text for more complete description.

The relative importance of these parameters can be seen in Figure 20. The six error equations corresponding to the total time differences of 1-2, 3-4, 6-7, 11-13, 23-25, and 47-49 hours are shown in the figure. Error estimates increase steadily with the total time differences previously listed. If we confine the data to time ratios from 0.2 to 0.8, a more reliable estimate of the importance of each parameter can be obtained. The justification being that all of the curves have roughly the same low errors near time ratios of 0.0 and 1.0. For any one of the curves in this range, the parameter of time ratio increases the error estimates at most by a factor of 3. The parameter of time difference, however, has a corresponding increase in error estimates as the cube of the time difference. Representing this in a mathematical form, we have:

$$E_e \approx [(3Rt), (Dt^3)] \quad (4)$$

The concept of time ratio was kept in the error equation for two reasons. The first reason was to give a worst error estimate, thereby allowing the user to select the best possible data for analysis. The other reason being that better than 95% of the error estimates provided to the oceanographic data set used the 1-2 hour time difference equation. At this low time difference, the time ratio becomes an equal contributor to estimation of errors.

Estimates of positions and velocities that required navigation points separated by more than 50 hours were given error defaults of 9999.9, even though the position and velocity were calculated. It was felt that after two days, error estimates would be extremely high (see equation 4) and therefore any resulting position and velocity must be flagged to indicate this. Error

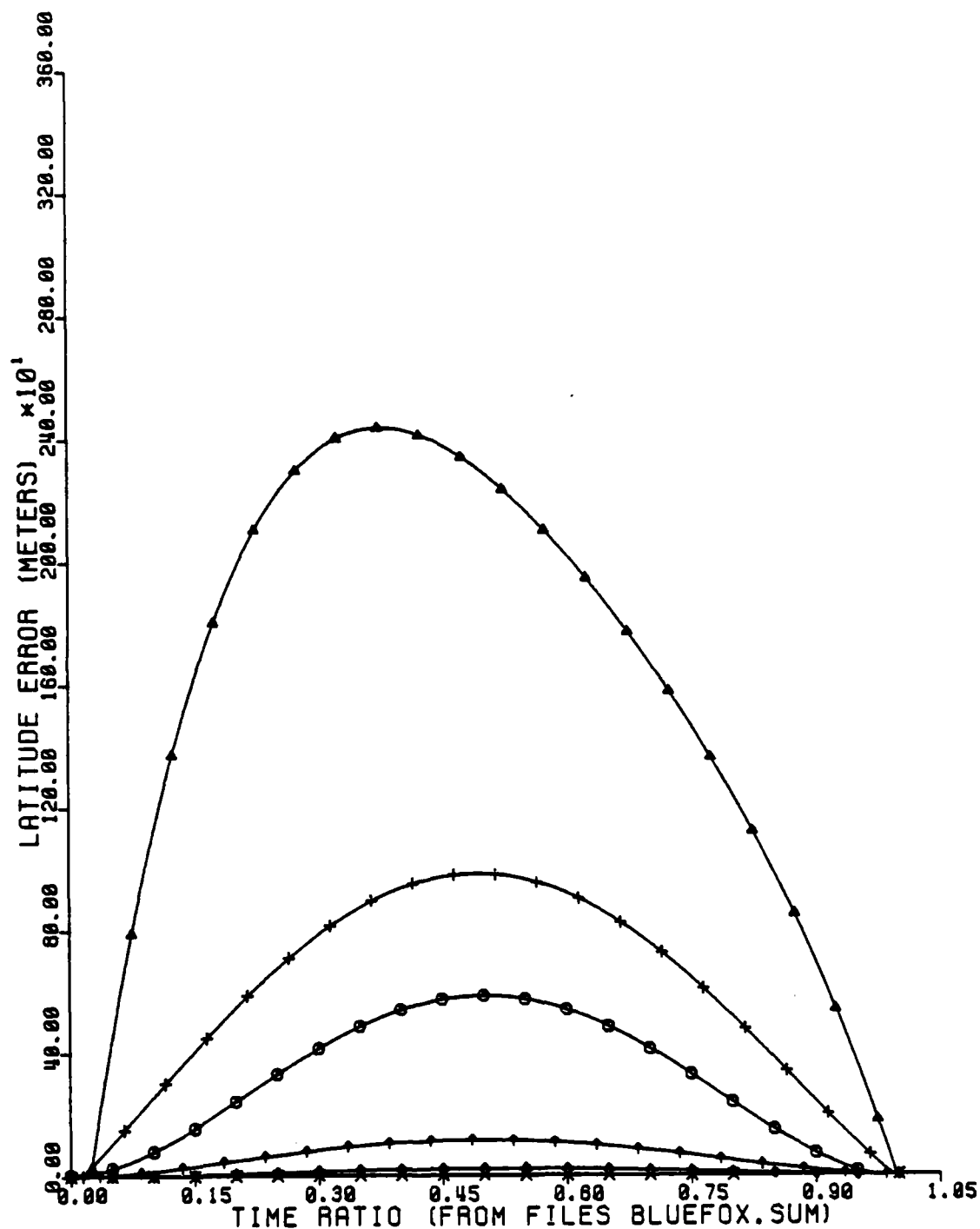


Figure 20. Shows relative importance of the time ratio and total time difference (Dt). The curves represent total time differences calculated from the summer data of Blue Fox. Symbols on the graph indicate the Dt as follows: x (1-2 HRS), diamond (3-4 HRS), up arrow (6-7 HRS), circle (11-13 HRS), + (23-25 HRS), and the triangle (47-49 HRS).

default data are extremely rare in this data set, however it should be reemphasized that the number is not to imply a quantitative estimate but designed to be a flag indicating questionable data.

Error estimates are also calculated to be negative in the cases where the time ratio is close to 0.0 or 1.0. These negative values are converted to zero since at these low time ratios, realistic errors are considered to be close to this value.

Coefficients for the 48 quadratic equations (4 equations per time band * 6 time bands per season * 2 seasons) were then placed in a computer program. With the maximum time difference and time ratio known, approximations to the 95% confidence error estimates could be computed for latitude, longitude, north and east ice velocity. These error estimates for position and ice velocity are in meters and cm/sec respectively. A copy of the subroutine listing that contains the coefficients of the quartic equations is shown in Appendix 2.

OUTPUT FORMAT OF FINAL DATA

This report consists entirely of absolute velocity data consisting of speed and direction at one meter intervals from the base of the ice to the maximum depth obtained by the sensor for any particular station. The limiting depth for all stations was 200 meters and was always obtained during low to moderate relative speeds in the water column. As the relative velocities increased, as in the presence of eddies, a significant portion of the 200 meters of cable was taken up in arching due to the increase in drag on the cable and sensor. During some eddies, maximum sensor depth may only be 140 meters even though the 200 meters of cable was payed out.

Station information is provided in two different formats, one being a numerical listing and the other being a plot of the profile. Two stations are graphically shown on one page of the data report. On the facing page, the corresponding numerical listing of the station is given.

The numerical data consist of other parameters relative to station information and are in some cases abbreviated to save space. A list of the parameters and their meaning is given in Table 3.

The plot of the absolute velocity profile is broken down into two components consisting of speed (shown as the solid line) and direction (shown as the dashed line). The speed scale is shown at the base of the profile. Three different scales for speed are used in the plotting of the figures, their respective maximum velocities being 25, 50 and 75 cm/sec. This was done to show as much structure as possible for the speeds indicated on any one particular profile. The directional scale is shown at the top of the profile and

is a fixed scale from 0 to 360 degrees relative to True North. The labeling of the plot consists of the camp identification, the station number, the date (day-month-year) and the time (GMT).

TABLE 3

BIG BEAR	First Main Camp
CARIBOU	Satellite Camp later to become Main Camp
BLUE FOX	Satellite Camp
SNOWBIRD	Satellite Camp
STATION	Consecutive station listing as shown on analog charts
(**M.)	Maximum depth of station in meters
LAT	Latitude of station in decimal degrees N implying North
LONG	Longitude of station in decimal degrees W implying West
LTER	Estimate of positional error for latitude in meters
LGER	Estimate of positional error for longitude in meters
NIVEL	North component of ice velocity (cm/sec)
EIVEL	East component of ice velocity (cm/sec)
NVER	Estimate of error in north ice velocity (cm/sec)
EVER	Estimate of error in east ice velocity (cm/sec)
DPT	Depth in meters
SPD	Absolute speed in cm/sec
DRN	Direction as related to True North. Directions with a code of 999.9 imply no direction reported.

Note ... All dates and times are given in terms of
Greenwich Mean Time.

FEATURES OBSERVED IN THE PROFILING CURRENT METER DATA

THE EKMAN LAYER

The concept of the planetary boundary layer, or Ekman layer, in which the velocity turns with depth, was first stimulated by observations of drifting ice. Nansen visualized the balances between surface wind stress, friction and Coriolis force which lead to a spiral structure for the current vectors. The idea was developed and set into mathematical form by Ekman. This layer, in which momentum exchange occurs between ice and water, was a central focus for the AIDJEX oceanographic program. Pack-ice forms a particularly stable platform for observations of behavior in the Ekman layer and observations of the Ekman spiral had been made from ice stations before the main AIDJEX experiment.

The PCM data, however, do frequently show indications of a spiral current structure in the upper layers. The vertically-integrated transport of water in the Ekman layer must flow at a right angle to the surface stress. In the northern hemisphere, the integrated flow is 90 degrees to the right of the surface stress. Water at the ice base will move with the ice in the direction of surface stress. Thus the current vectors will spiral downward to the right to achieve a net flow to the right. The exact shape of the spiral depends on the conditions of turbulence and stratification in the layer. A clockwise tendency for the current vectors is often noted in the current profiles. This indicates downward transfer of momentum from ice to water. Counterclockwise turning is also observed but less frequently. It indicates momentum transfer upwards from water to ice. Figures 21a and 21b show the

effect of ice velocity addition on an Ekman spiral. Figure 21a is the relative trace showing a well developed directional shear of approximately 360 degrees. With the addition of the ice velocity vector, the directional shear is somewhat altered as seen in Figure 21b. Notice also the high directional shears at low speeds.

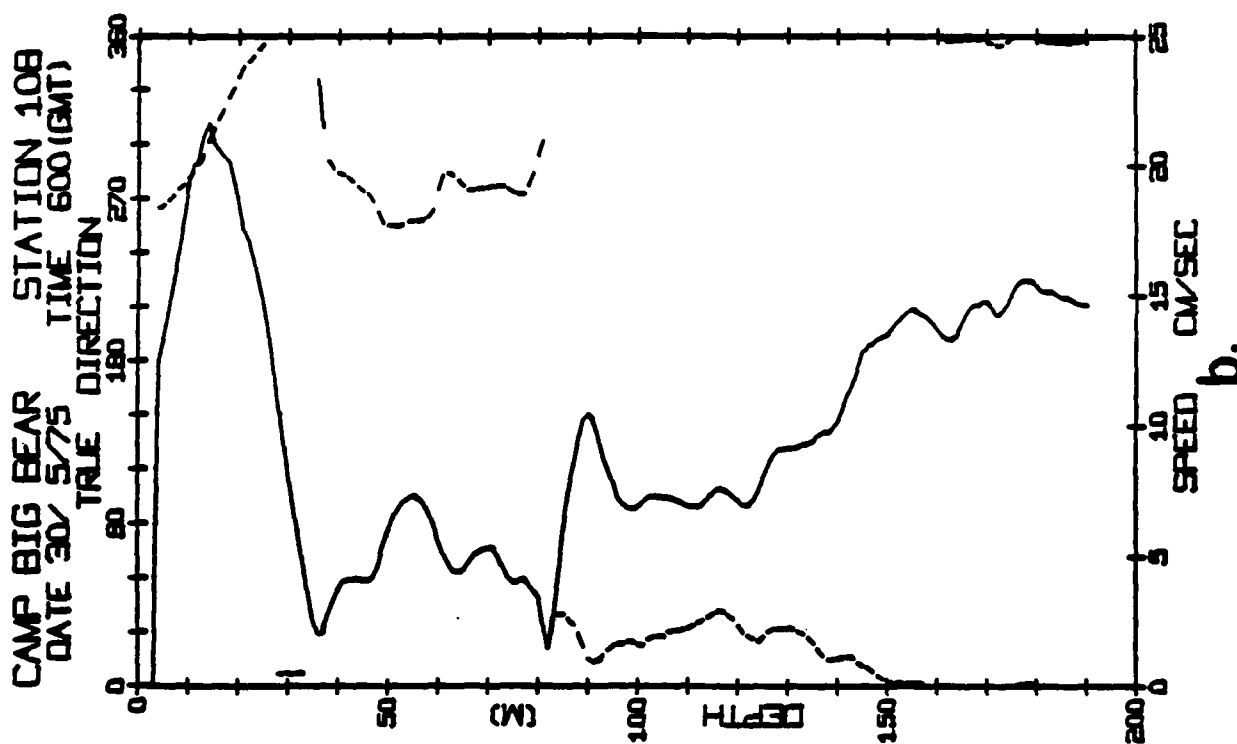
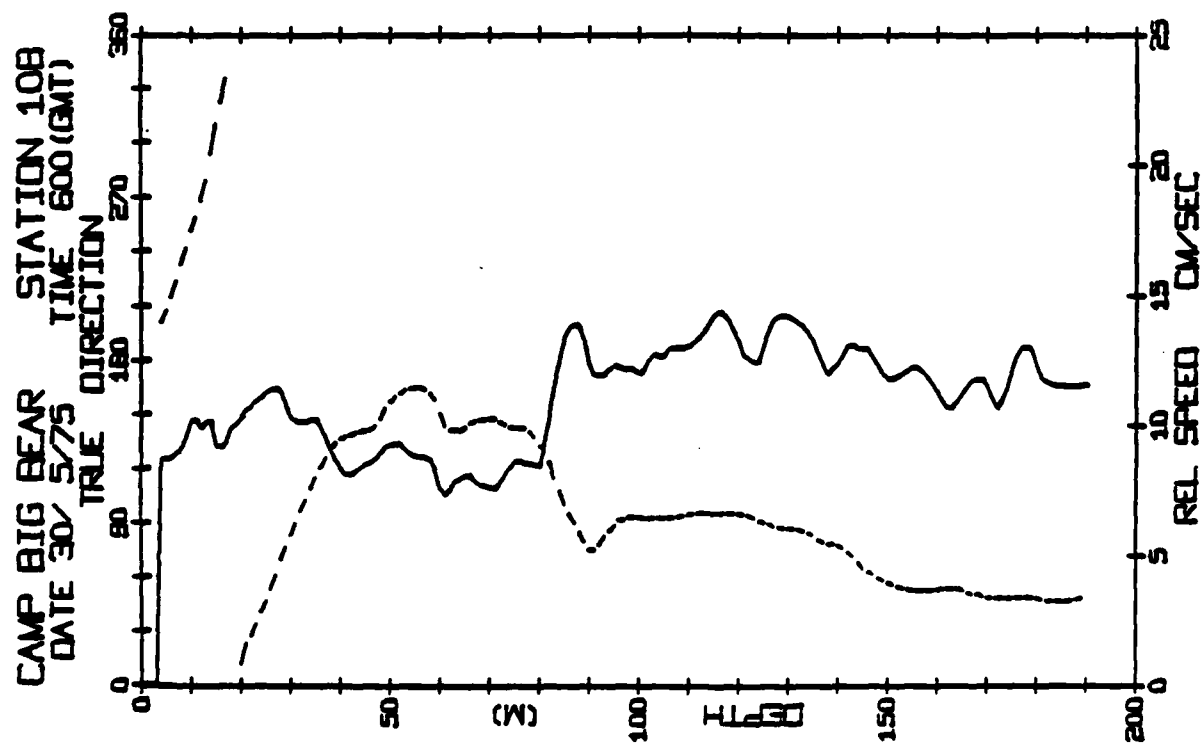


Figure 21. Graphically shows the result of adding the ice velocity vector to an Ekman spiral seen on a relative velocity profile (a) to produce absolute velocity data (b). Notice the change in directional shear between the relative and absolute profile from a depth of 20 to 40 meters.

SUBSURFACE EDDIES

Swift mesoscale undercurrents are one of the most notable oceanographic features observed in the AIDJEX area of the Arctic Ocean. The eddy form of these undercurrents was first described as a result of the 1972 AIDJEX pilot program. The eddies were shown to be 10 to 20 kilometers across and to extend in depth from 50 to 300 meters. The temperature and salinity fields as well as the velocity field are perturbed by the eddies which are baroclinic, and are approximately in geostrophic balance (Hunkins, 1974; Newton et al., 1974).

The 1975-76 data confirm that eddies are a common feature of this part of the Arctic Ocean. Maximum current speeds were found at depths ranging from 80 to 190 meters. In some cases current speeds attain a maximum of 59 cm/sec. Examples of different eddies at the four camps are shown in Figures 22-25. The 1972 data taken at discrete levels showed the rounded shape of the current profile. PCM data also show this but with some small scale structure imposed on the broad nose. There is often little directional shear through the eddy as in Figures 22 and 23, although, in some cases, as in Figures 24 and 25, there may be directional as well as speed shear through the eddy depth.

In Figures 26-29, current velocity vectors at four depths are plotted as a function of time at each of the four camps. Ice velocity vectors are at the top of each diagram. Days are numbered in sequence starting from January 1, 1975 (see Appendix 3). Examples of eddies are evident at each station. The eddy profiled in Figure 23 can be seen between days 151-155 of

Figure 27. The eddy profiled in Figure 24 appears in Figure 28 between days 150-154, while the eddy in Figure 25 appears in Figure 29, days 165-169. The eddy observed at Caribou, Figure 22, can be seen in Figure 26 between days 327 and 330. Although two of the eddies at different camps overlap in time, the camps are separated by 170 kilometers and are undoubtedly two distinct features. The tendency of the current vector to rotate with time is attributed to two reasons, (1) passage of the camp over the eddy, and (2) the translational velocity of the eddy. In most cases, the velocity of the camp is significantly greater than the velocity of the eddy. Profiles taken in this case appear to "freeze" the eddy as the camp passes over.

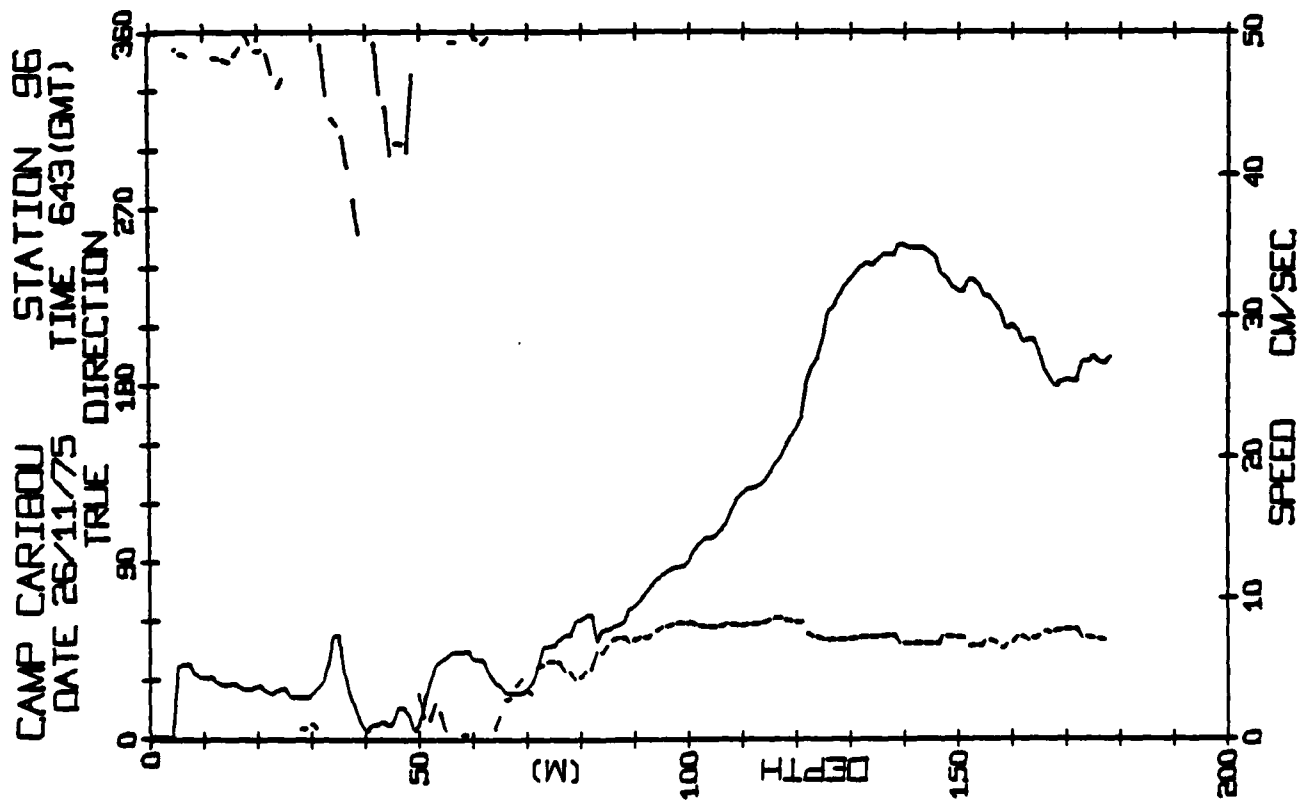


Figure 22. Eddy profile observed at camp Caribou.

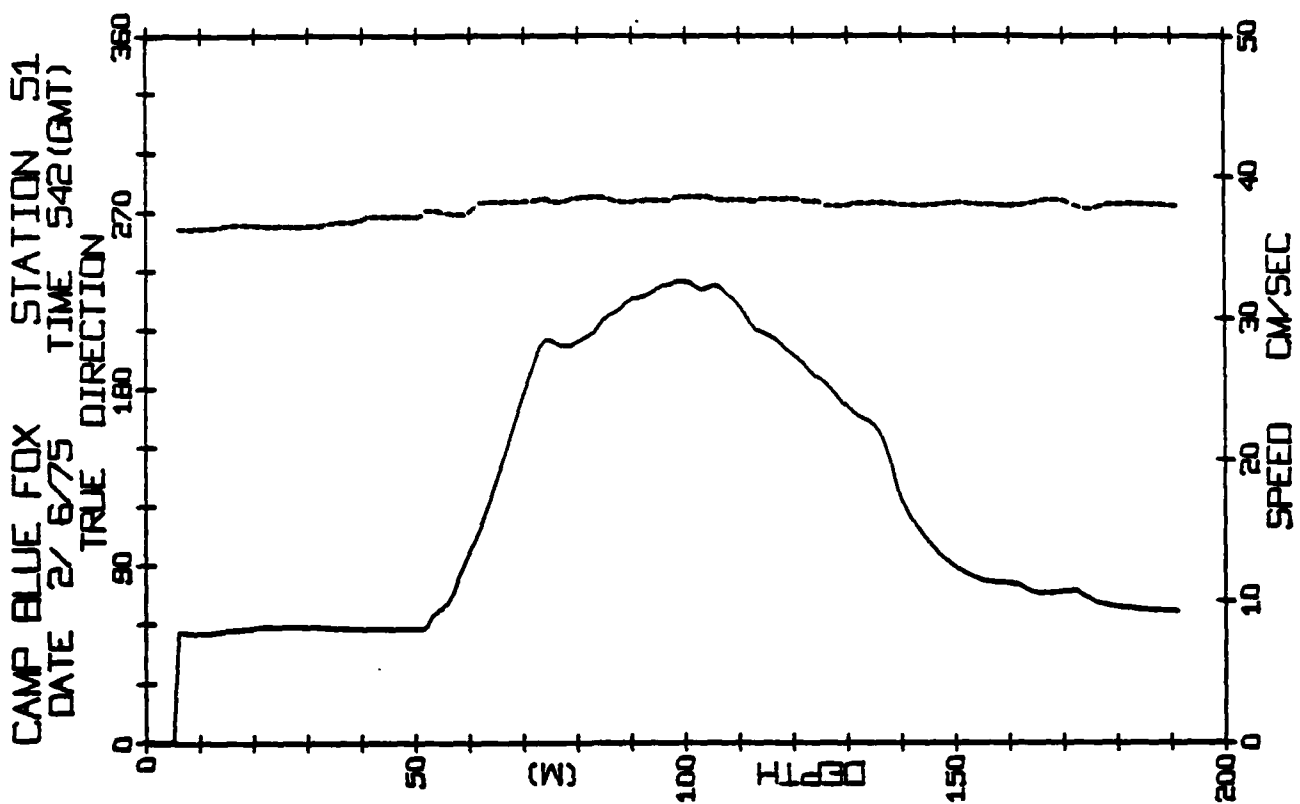


Figure 23. Eddy profile observed at camp Blue Fox.

CAMP SNOWBIRD STATION 49
DATE 30/ 5/75 TIME 2043(GMT)
TRUE DIRECTION

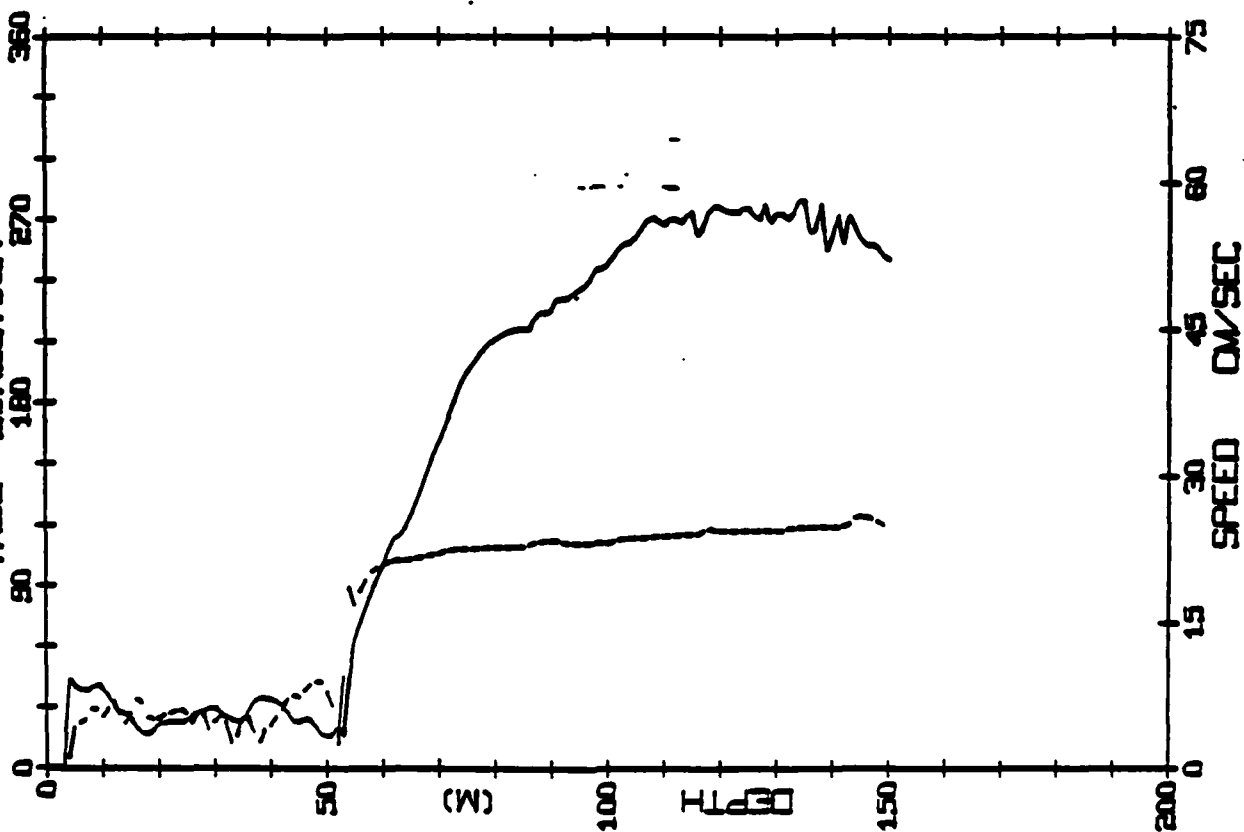


Figure 24. Eddy profile observed at camp Snowbird.

CAMP BIG BEAR STATION 154
DATE 14/ 6/75 TIME 1944(GMT)
TRUE DIRECTION

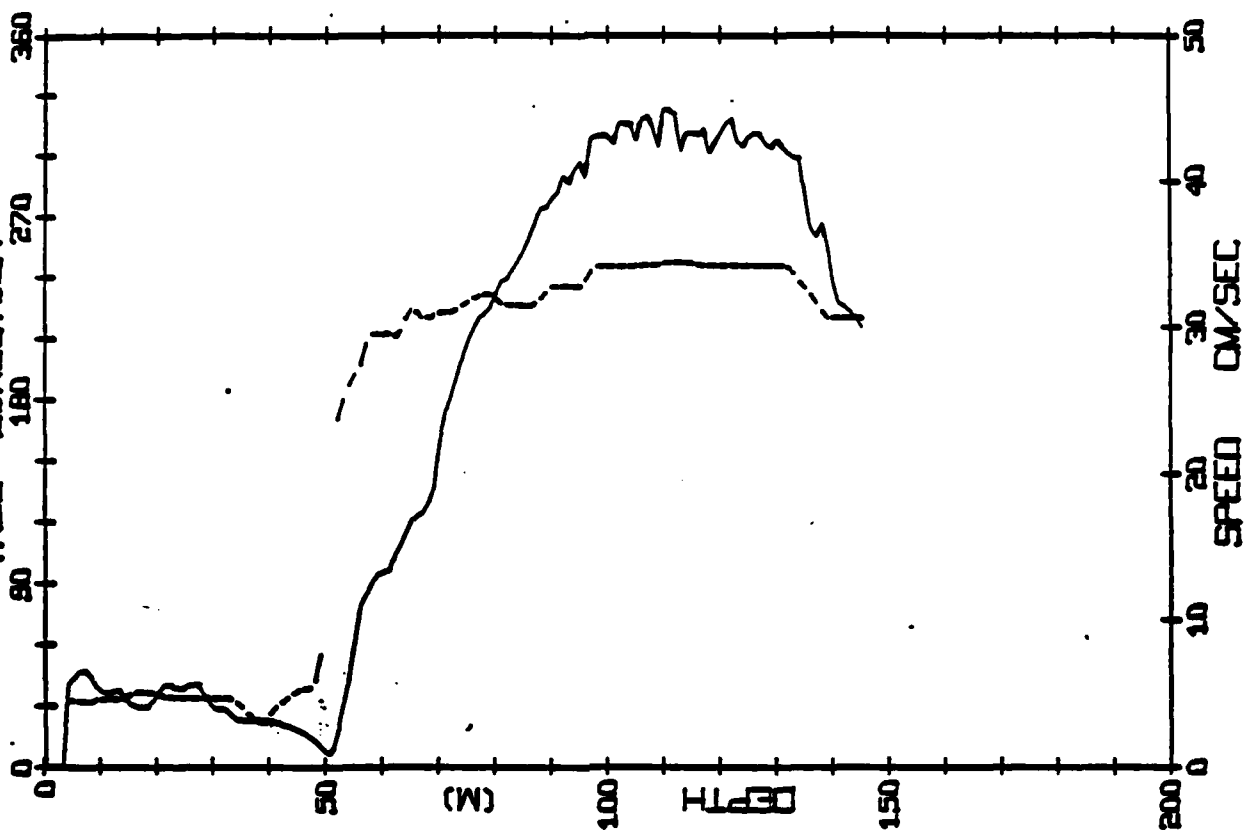


Figure 25. Eddy profile observed at camp Big Bear.

WIND-DRIVEN CURRENTS

Although the effect of wind-driven ice on the Ekman layer has been observed for some time, deeper influences have not been as carefully studied. Wind and ice motion are generally coherent over the array. There should be a clear separation of spatial scales between the ice-driven current scale of order 1000 kilometers and the baroclinic eddy scale of order 10 kilometers. Clear examples of barotropic currents appear in Figure 26, days 324-327, days 335-336, and days 368-370. These currents change little with depth, in contrast to the highly barotropic eddies. Other barotropic currents appear intermittently in Figures 27-29. However, random observations of eddies mask these currents below 50 meters. Such masking can be seen in Figure 27, days 170-174, Figure 28, days 149-156, and Figure 29, days 157-168.

Barotropic behavior is expected for currents generated by a transient wind stress. As the stress becomes less impulsive, more baroclinic motion would be produced. Thus the wind field at the largest time and space scales, the mean winds over the Canada Basin, generate the large scale Beaufort gyre. Short period wind and ice motion will result in a more barotropic response. Barotropic motions would not be reflected in the temperature and salinity profiles. They are detectable only with current meters or absolute measurements of surface height and tilt.

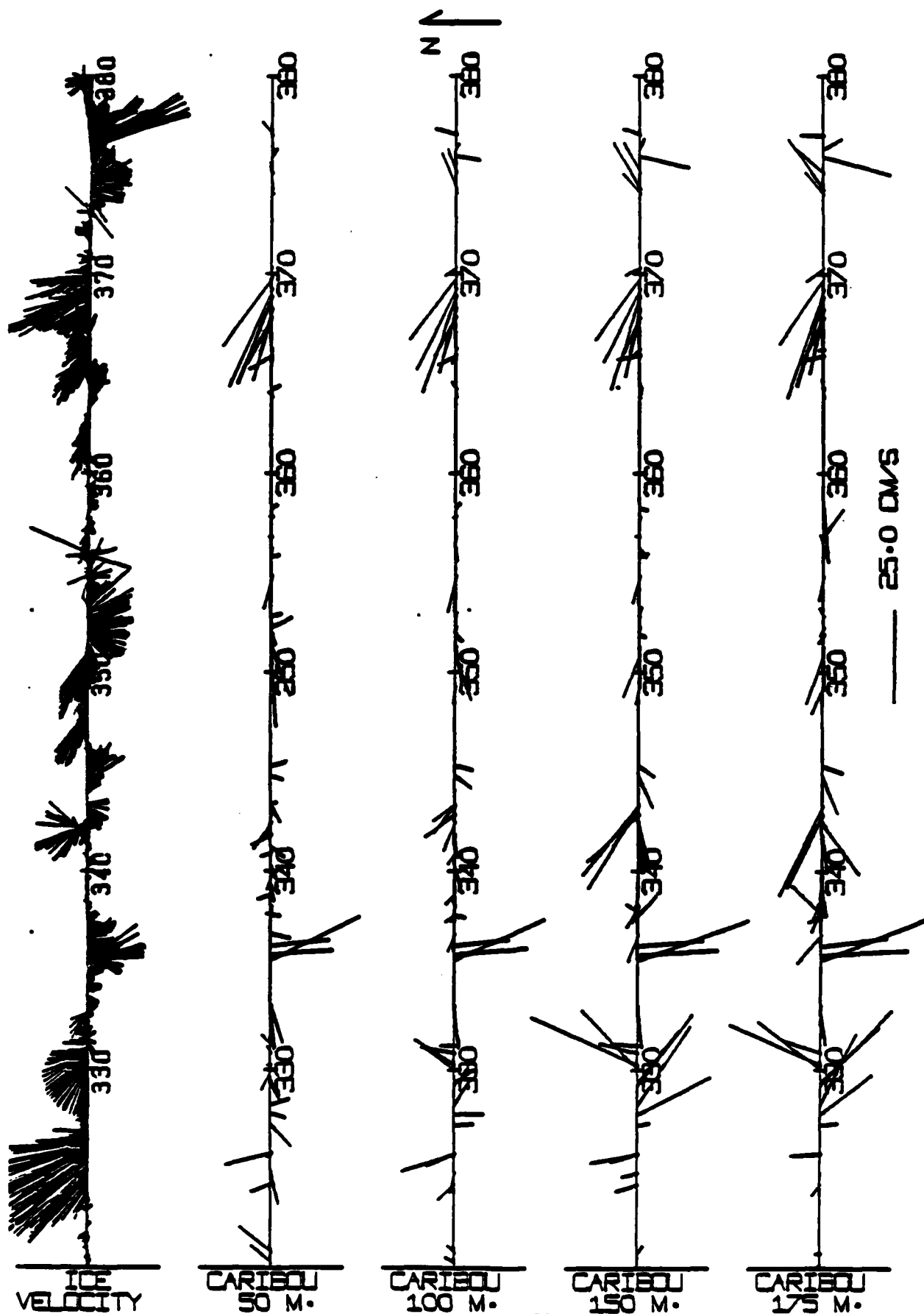


Figure 26. Stick diagram of profiling current meter data from camp Caribou at preselected depths of 50, 100, 150 and 175 meters. Ice velocity observed at camp is plotted at top of diagram. Vector pointing vertically upwards implies movement towards True North. AIDJEX days are shown on the horizontal axis.

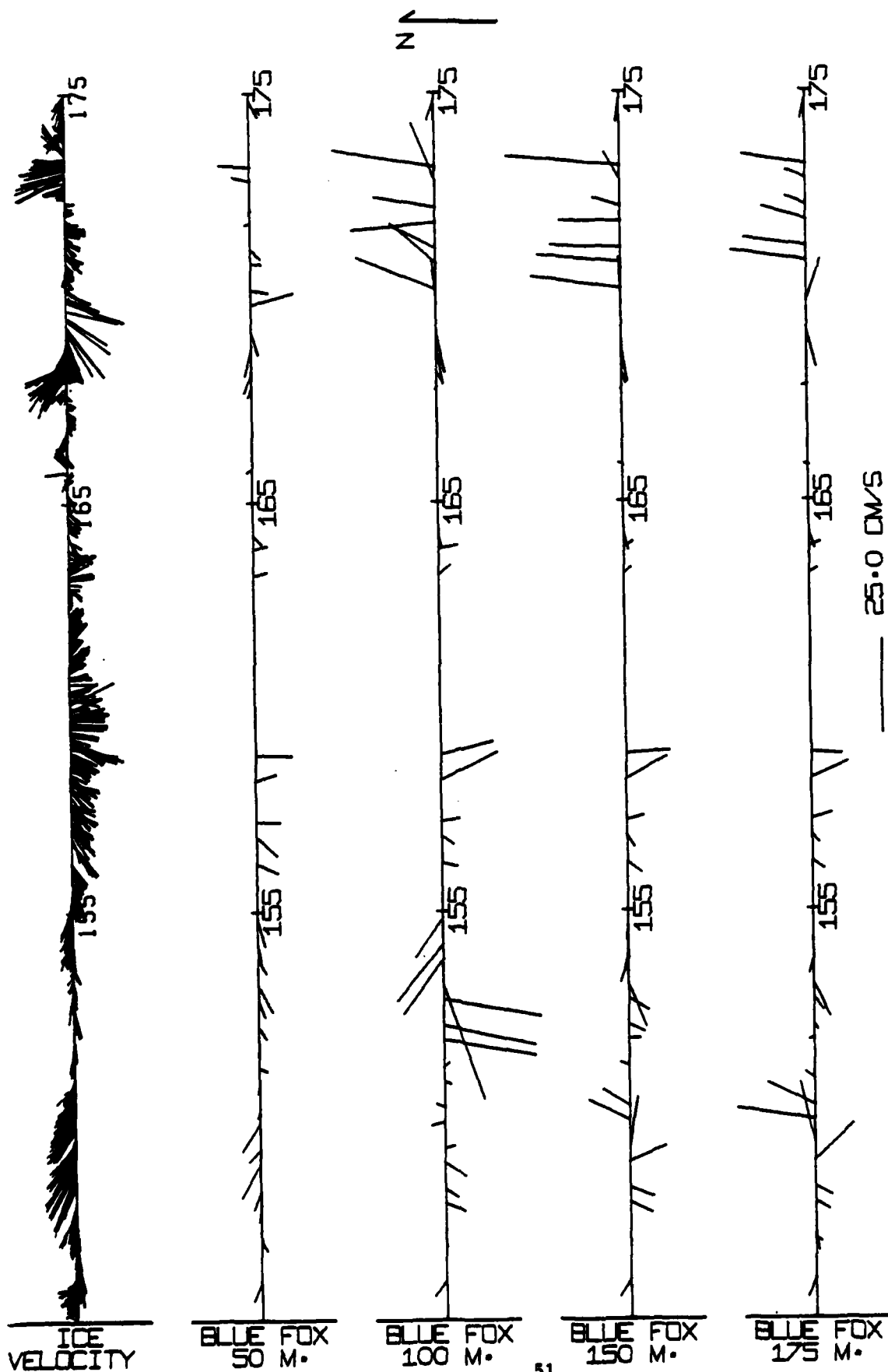


Figure 27. Stick diagram of profiling current meter data from camp Blue Fox at preselected depths of 50, 100, 150 and 175 meters. Ice velocity observed at camp is plotted at top of diagram. Vector pointing vertically upwards implies movement towards True North. AIDJEX days are shown on the horizontal axis.

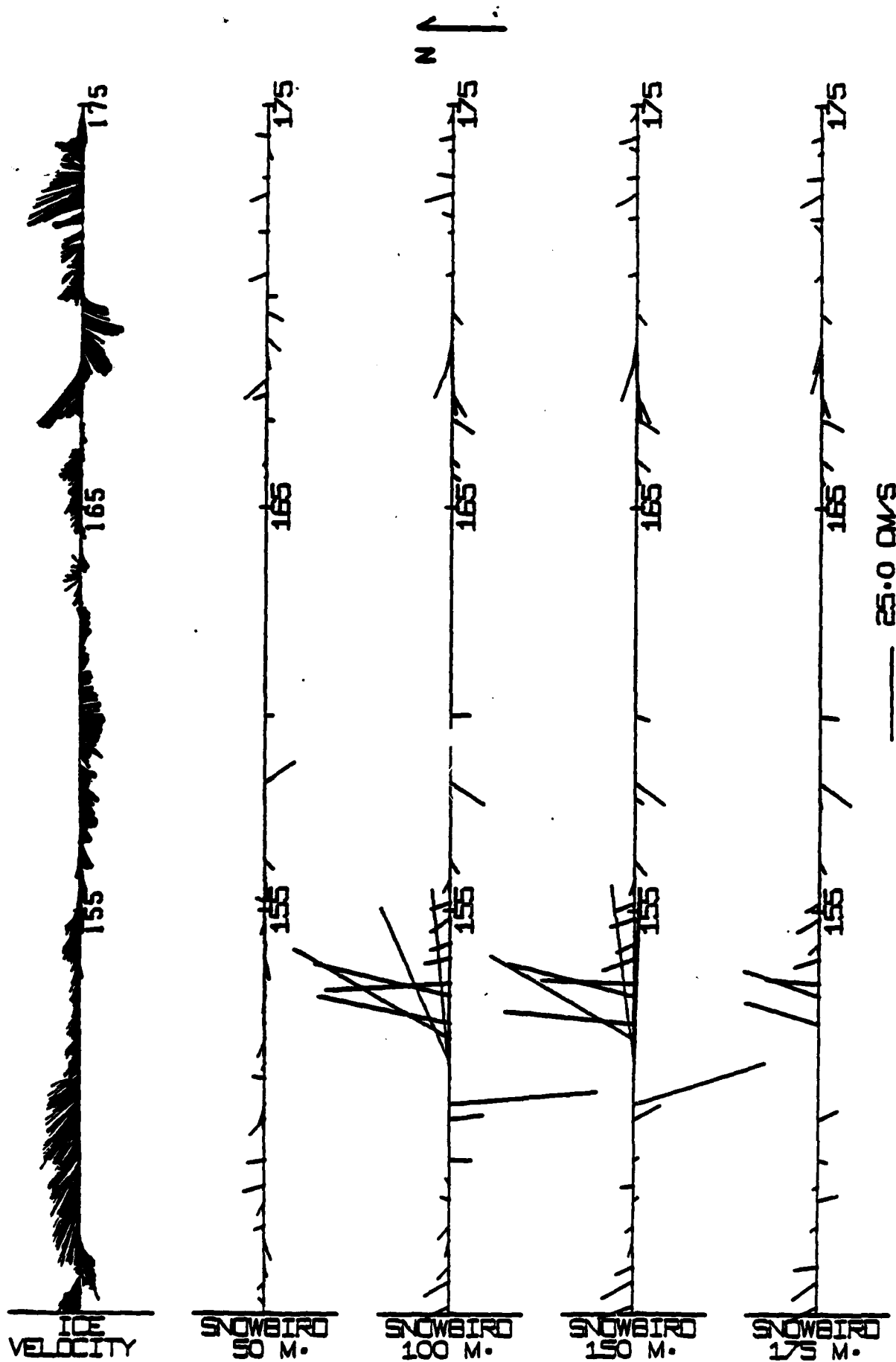


Figure 28. Stick diagram of profiling current meter data through time from camp Snowbird at preselected depths of 50, 100, 150 and 175 meters. Ice velocity observed at the camp is plotted at top of diagram. Vector pointing vertically upwards implies movement towards True North. AIDJEX days are shown on the horizontal axis.

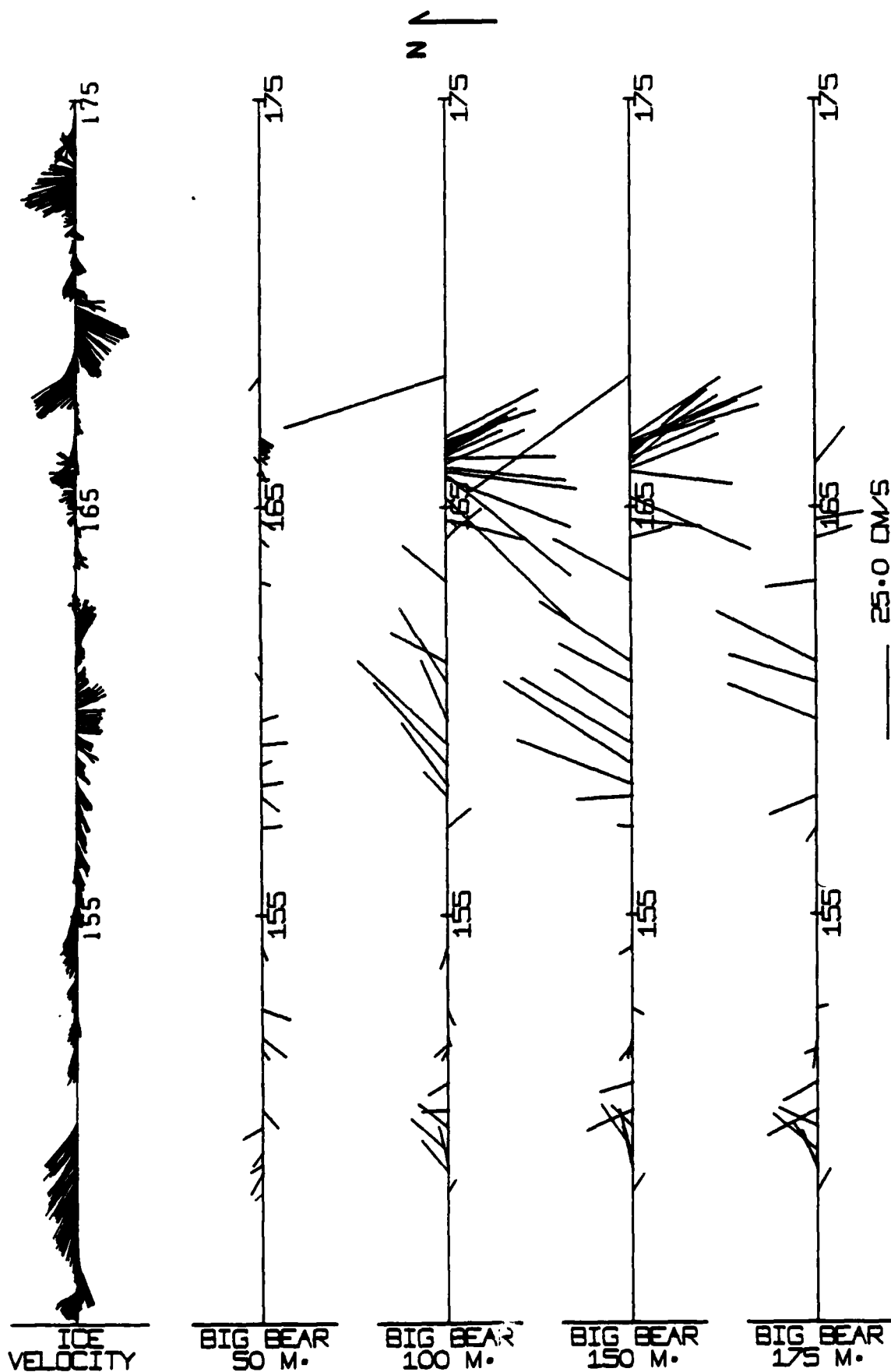


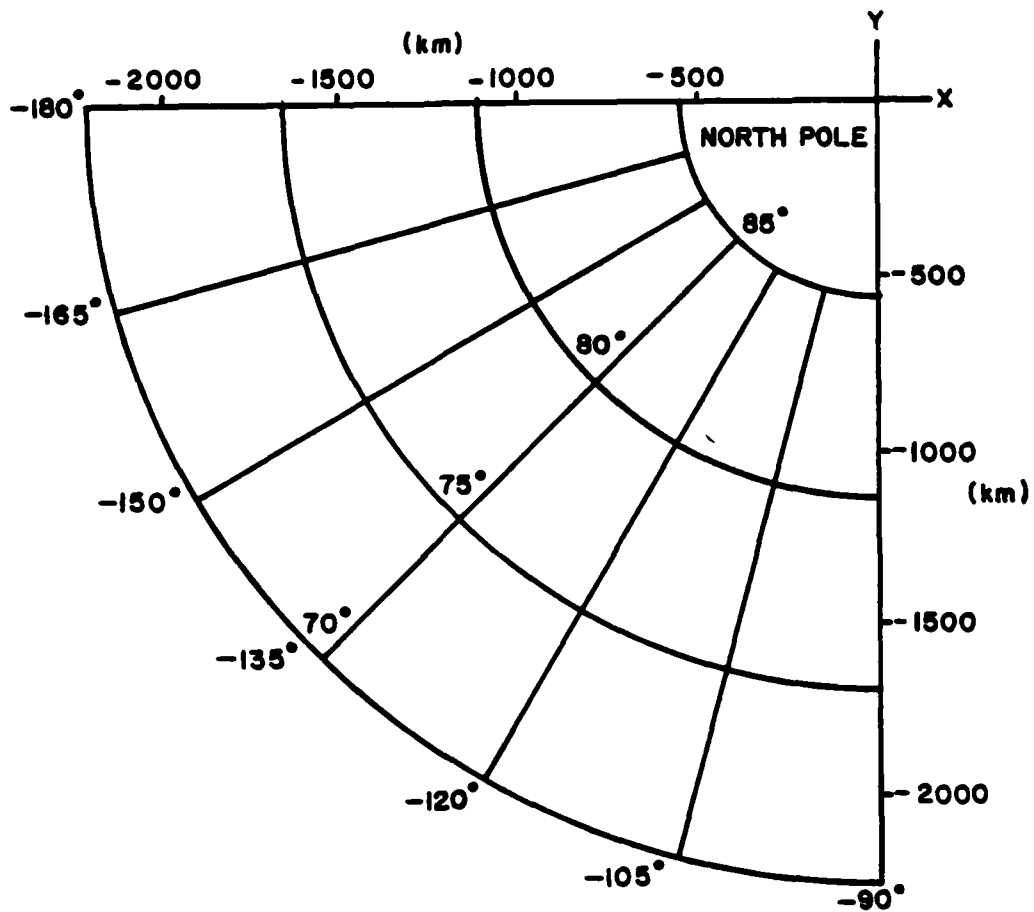
Figure 29. Stick diagram of profiling current meter data through time from camp Big Bear at preselected depths of 50, 100, 150 and 175 meters. Ice velocity observed at the camp is plotted at top of diagram. Vector pointing vertically upwards implies movement towards True North. AIDJEX days are shown on the horizontal axis.

ACKNOWLEDGEMENTS

The AIDJEX oceanographic program was carried out with the financial support from the Office of Naval Research under contract N00014-76-C-0004.

We are pleased to acknowledge the efforts of the people who operated the current meters at the various camps: Barry Allen, Jai Ardal, Bharrat Dixit, Alan Gill, Brian Hill, and Paul Peltola.

APPENDIX 1 COORDINATE SYSTEMS



Position measurements were made in geographical coordinates (latitude north, longitude east). The smoothing operation was done in a Cartesian system (x,y), where

$$x = 110.949 (90^\circ - \text{latitude}) \cos (\text{longitude}) \text{ (km)}$$

$$y = 110.949 (90^\circ - \text{latitude}) \sin (\text{longitude}) \text{ (km)}$$

APPENDIX 2

Subroutine PSNVEL is written in FORTRAN IV-PLUS and is adapted for use on a PDP 11/70. This subroutine calculates the position and ice velocity from the data base of Thorndike and Manley, 1980. Error estimates are also calculated for latitude, longitude, north and east ice velocities. The coefficients for the error estimate equations are found at the end of the subroutine. The actual equation is written as an arithmetic statement function near the beginning of the listing. Decimal AIDJEX days (Appendix 3) are used extensively in this subroutine.

```

C*****
C***** SUBROUTINE PSNVEL ***** AIDJEX POSITION AND VELOCITY DETERMINATION *****
C*****
C***** PROGRAMMER -- TOM MANLEY *****
C***** DATE -- AUG. 01, 1979 *****
C*****
C** SUBROUTINE PSNVEL INTERPOLATES BETWEEN TWO CONSECUTIVE POSITIONAL OBSER-
C** VATIONS USING THE UPDATED SATELLITE-NAVIGATION DATA AS ITS BASE. INTERPOL-
C** ATION IS BASED ON 2 CUBIC EQUATIONS DEFINED UNIQUELY BY THE BOUNDING NAV-
C** IIGATION POINTS.
C** ERROR ESTIMATES TO THE CALCULATED POSITION AND ICE VELOCITY ARE SUPPLIED
C** TO THE USER VIA THE 48 QUARTIC ERROR EQUATIONS DEFINED AT THE END OF THE
C** SUBROUTINE.
C** ALL DATES AND TIMES USED IN THE NAVIGATIONAL DATA SET AND THIS SUBROUTINE*
C** MUST BE GREENWICH MEAN TIME.
C*****
C** INPUT PARAMETERS ARE AS FOLLOWS:
C** 1) IUNIT -- THE UNIT NUMBER THAT THE PROGRAM WILL USE IN OPENING THE
C** APPROPRIATE CAMP FILE. ** NOTE ** THE UNIT WILL BE OPENED
C** PERMANENTLY UNLESS THE CAMP IDENTIFIER CHANGES. IF THIS IS
C** TRUE, THEN THE CURRENT FILE WILL BE CLOSED AND THE NEW CAMP
C** NAVIGATION FILE WILL BE OPEN.
C** 2) ICAMP -- THE CAMP ALPHANUMERIC(A2) I.E.--> BB,CB,BF,SB,M1
C** 3) IDAY -- THE DAY IN QUESTION
C** 4) MON -- THE MONTH IN QUESTION
C** 5) IYR -- THE YEAR IN QUESTION
C** 6) ITIME -- THE TIME IN QUESTION
C*****
C** OUTPUT PARAMETERS ARE AS FOLLOWS:
C** 1) RLAT -- LATITUDE OF THE STATION
C** 2) RLON -- LONGITUDE OF THE STATION
C** 3) VELN -- NORTH VELOCITY IN CM/SEC
C** 4) VELE -- EAST VELOCITY IN CM/SEC
C** 5) LTERR -- ERROR ESTIMATE(95% CONFIDENCE) ON LATITUDE( IN METERS)
C** 6) LGERR -- ERROR ESTIMATE(95% CONFIDENCE) ON LONGITUDE( IN METERS)
C** 7) VNERR -- ERROR ESTIMATE(95% CONFIDENCE) ON NORTH VELOCITY(IN CM/SEC)
C** 8) NEERR -- ERROR ESTIMATE(95% CONFIDENCE) ON EAST VELOCITY (IN CM/SEC)
C*****
C** ** NOTE ** IF THE LAT. AND LONG ARE NOT AVAILABLE, THE SUBROUTINE
C** GIVES THE FOLLOWING INFORMATION:
C** RLAT = 9999.9 RLON = 9999.9
C** VELN = 9999.9 VELE = 9999.9
C** LTERR = 9999.9 LGERR = 9999.9
C** VNERR = 9999.9 VEERR = 9999.9
C*****
C** ** NOTE ** IF THE BOUNDING SETS OF NAVIGATION DATA USED TO DEFINE THE
C** CUBIC EQUATIONS ARE MORE THAN 50 HOURS APART, POSITION AND ICE VELOCITY*
C** WILL BE PROVIDED. DEFAULT VALUES WILL HOWEVER BE ASSIGNED TO THE ERROR
C** ESTIMATES AS FOLLOWS:
C** LTERR = 9999.9 LGERR = 9999.9
C** VNERR = 9999.9 VEERR = 9999.9
C*****
C** PARAMETERS THAT ARE NOT TO BE CHANGED BY THE USER DURING A RUN:
C** 1) FILE -- INDICATES THE FILE HAS ALREADY BEEN OPENED
C** 'YES' IF TRUE, 0 IF NO
C** THIS CUTS DOWN ON THE AMOUNT OF TIME SPENT OPENING AND CLOS-
C** ING THE FILE.
C** 2) ICMPCK - INTEGER CAMP CHECK VARIABLE. THIS HOLDS THE ID "CODE" OF THE
C** CAMP NUMBER WHOSE NAVIGATION FILE IS CURRENTLY OPENED.
C** IF ICMPCK AND ICAMP DO NOT AGREE, THEN THE CURRENT FILE
C** IS CLOSED AND THE NEW NAVIGATION FILE CORRESPONDING TO THE
C** NEW CAMP ID "ICAMP" IS OPENED. ICMPCK IS THEN CHANGED TO
C** ICAMP.
C** 3) IDBSE - THE INTEGER THAT HOLDS THE BASE DAY SUBTRACTION CONSTANT
C** USED BY THE SUBROUTINE TO DETERMINE THE LOCATION OF ALL THE
C** DAYS IN THE NAVIGATION FILE. -----> UNDER NO CIRCUMSTANCES
C** SHOULD THIS VARIABLE BE CHANGED DURING A RUN ON ANY ONE CAMP.
C** 4) IYR0SE - THE INTEGER THAT HOLDS THE BASE YEAR UPON WHICH THE JULIAN
C** DAY IS DETERMINED. THE BASE YEAR IS DETERMINED THROUGH THE
C** SUBROUTINE "CPCODE" AS ONE OF THE OUTPUT PARAMETERS. BASE
C** YEARS WILL CHANGE WITH THE CAMPS SUCH AS THE MAIN AIDJEX
C** EXPERIMENT BEING BASED ON THE YEAR 1975. THE FRAM 1 DATA IS
C** BASED ON THE YEAR 1979. -----> UNDER NO CIRCUMSTANCES
C** SHOULD THIS VARIABLE BE CHANGED DURING A RUN ON ANY ONE CAMP.
C*****
C*****
C*****

```

```

C*****
C****
C**
C**
C**      SUBROUTINE PSNVEL(IUNIT, ICAMP, IDAY, MON, IYR, ITIME, FILE, RLAT, RLON,
1 VELN, VELE, LTERR, LGERR, VNERR, VEERR, ICMPCK, IDBSE, IYRBSSE)
C**
      IMPLICIT REAL*8 (Z)
      REAL*8 RAD
      REAL LTERR, LGERR
      BYTE FILNAM(30), DIR(11)
      DIMENSION INAM(4)
C**
C** DEFINE A FUNCTION FOR THE QUARTIC ERROR ESTIMATES
C**
      Q(E,D,C,B,A,T)=A*T**4 + B*T**3 + C*T**2 + D*T + E
C**
C** SET AN ERROR CODE
C**
      CALL ERRSET(39,.TRUE.,.FALSE.,.TRUE.,.FALSE.,100)
C**
C**
      DATA FILNAM(30)/0/
      RAD = DASIN(1.000)/90.000
C**
C** CHECK TO SEE IF FILES ARE ALREADY OPENED
C**
10 IF((ICMPCK.EQ.ICAMP) .AND. (FILE .EQ. 'YES')) GO TO 77
   IF((ICMPCK.NE.ICAMP) .AND. (FILE .NE. 'YES')) GO TO 18
   IF((ICMPCK.NE.ICAMP) .AND. (FILE .EQ. 'YES')) GO TO 15
15 CLOSE(UNIT=INAM(1))
18 ENCODE(20,23,FILNAM) ICAMP
23 FORMAT('DB2: (310,1)NAVDAT.',A2)
   ICMPCK = ICAMP
C**
      OPEN(UNIT=IUNIT, NAME=FILNAM, TYPE='OLD',
1 ACCESS='DIRECT', FORM='FORMATTED', RECORDSIZE=70)
      FILE = 'YES'
C***=> FIND THE BASE YEAR FOR THE CAMP DATA
      I = 0
      CALL CPCODE(ICAMP, I, ZCAMA9, IYRBSSE)
C***=> NOW FIND THE BASE JULIAN DAY THAT THE FILE WAS BASED ON USING TH
C***=> EQUATION IREC = (IJULDAY-IBASEDAY)*75 -1
      DO 27 IREC = 1,2000
      READ(IUNIT'IREC,20) RDAY
      IF(RDAY.EQ. 0.0) GO TO 27
      IDY = RDAY
      IDBSE = IDY - IFIX(((IREC-1)/75.))+.5)
D   TYPE 31, ICAMP, IDY, IREC, IDBSE
D   31 FORMAT(2X, 'CAMP->', A2, ' DAY/IREC/IDBASE=>', 3I6)
      GO TO 28
27 CONTINUE
28 CONTINUE
C**
C** CALCULATE THE RECORD NUMBER OF THE FIRST NAVIGATION POINTS CLOSEST
C** TO THE TIME OF THE STATION IN QUESTION
C**
77 CALL JULDAY(IDAY, MON, IYR, ITIME, IYRBSSE, RDAY)
      IADY = RDAY
      IREC = (IADY - IDBSE)*75 + 1
D   TYPE 66, IREC, IADY, IAPER
D   66 FORMAT(2X, 'IREC/IADY/IAPER--->', 3I6)
C**
C** CHECK FOR BAD RECORD NUMBER
C**
      IF(IREC .GE. 1) GO TO 79
45 RLAT = 9999.9
      RLON = 9999.9
      VELN = 9999.9
      VELE = 9999.9
      VNERR = 9999.9
      VEERR = 9999.9
      LTERR = 9999.9
      LGERR = 9999.9
      GO TO 300
C**
C** READ THE RECORD
C**
79 READ(IUNIT'IREC,20) DAYS, RLATS, RLONS, VELNS, VELES

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20 FORMAT(2X,3F12.6,2F9.1)
C**
C** IF THE BEGINNING RECORD HAS NO INFORMATION ON IT, KEEP INCREMENTING
C** THE IREC COUNTER UNTIL A RECORD WITH INFORMATION HAS BEEN FOUND
C**
      IF(DAYS.NE.0.0) GO TO 83
      IREC = IREC + 1
      GO TO 79
C**
C** TURN THE DESIRED TIME INTO DECIMAL DAYS
C**
      83 IHR = ITIME/100.0 + .01
      IMN = (ITIME-(IHR*100))
      DAYSTN = (IADY*1.0) + (IHR/24.0) + (IMN/1440.)
      IDYSTN = DAYSTN
      TYPE 87, DAYSTN
D 87 FORMAT(2X,'TIME OF DESIRED POINT => ',F12.6)
C**
C** CHECK TO SEE WHICH RECORD TO READ FOR THE BOUNDING INFORMATION
C**
C**
      IF((IDYSTN.LT.IDBSE) .AND. (IDYSTN.GT.500)) GO TO 45
      IF((IDYSTN.EQ.IDBSE) .AND. (DAYSTN.LT.DAYS)) GO TO 45
      IF(DAYSTN.LT.DAYS) GO TO 50
      IF(DAYSTN.GE.DAYS) GO TO 100
C** READ PREVIOUS RECORD
C**
      50 IREC = IREC -1
      READ(IUNIT,IREC,20) DAYE,RLATE,RLONE,VELNE,VELEE
C**=> CHECK FOR RECORD WITH NO DATA LISTED ON IT
      IF((RLATE.EQ.0.0).OR.(RLONE.EQ.0.0)) GO TO 50
C* => REORIENT THE DATA SO DAYS IS FIRST IN TIME, DAYE IS LAST
      DY = DAYS
      RL = RLATS
      RG = RLONS
      VN = VELNS
      VE = VELES
      DAYS = DAYE
      RLATS = RLATE
      RLONS = RLONE
      VELNS = VELNE
      VELES = VELEE
      DAYE = DY
      RLATE = RL
      RLONE = RG
      VELNE = VN
      VELEE = VE
      GO TO 200
C**
C** READ FOLLOWING RECORD
C**
      100 IREC = IREC + 1
      READ(IUNIT,IREC,20,ERR=45) DAYE,RLATE,RLONE,VELNE,VELEE
C**=> CHECK FOR RECORD WITH NO DATA LISTED ON IT
      IF((RLATE.EQ.0.0).OR.(RLONE.EQ.0.0)) GO TO 100
      IF(DAYSTN.LE.DAYE) GO TO 200
      DAYS = DAYE
      RLATS = RLATE
      RLONS = RLONE
      VELNS = VELNE
      VELES = VELEE
      GO TO 100
C**
C** START WITH TIME INTERPOLATION FOR LATITUDE AND VELOCITY NORTH
C**
C**=> CHANGE TIME POINTS IN DAYS TO TIME POINTS IN SECONDS
      200 CONTINUE
D 43 TYPE 43, DAYS,RLATS,RLONS,VELNS,VELES
D 43 FORMAT(2X,'START=> ',3F12.6,2F9.1)
D 24 TYPE 24, DAYE,RLATE,RLONE,VELNE,VELEE
D 24 FORMAT(2X,'END ==> ',3F12.6,2F9.1)
      ZT1 = DAYS*86400.00
      ZT2 = DAYE*86400.00
      ZTS = DAYSTN*86400.00
      ZC = ZT2 - ZT1
C**=> CHANGE THE VEL TO DEGREES (LAT OR LONG)/SEC
      ZVELNS = VELNS/11094900.00
      ZVELNE = VELNE/11094900.00
      ZVELES = VELES/((11094900.00*DCOS(RLATS*RAD))
      ZVELEE = VELEE/((11094900.00*DCOS(RLATE*RAD))

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ZATNT = ZTS - ZT1
ZALP = (ZVELNE - ZVELNS)/(3.00*ZC**2)
ZBET = -2.00/(3.00*ZC)
ZB = (RLATE-RLATS-ZVELNS*ZC-ZALP*ZC**3)/(ZBET*ZC**3+ZC**2)
ZA = ZALP + ZBET*ZB
RLAT = (ZA*ZATNT**3)+(ZB*ZATNT**2)+(ZVELNS*ZATNT)+RLATS
ZVELN = (3.00*ZA*ZATNT**2)+(2.00*ZB*ZATNT)+ZVELNS
C**
C** NOW FIGURE OUT THE LONGITUDE AND THE VELOCITY EAST
C**
ZALP = (ZVELEE - ZVELES)/(3.00*ZC**2)
ZBET = -2.00/(3.00*ZC)
ZB = (RLONE-RLONS-ZVELES*ZC-ZALP*ZC**3)/(ZBET*ZC**3+ZC**2)
ZA = ZALP + ZBET*ZB
RLON = (ZA*ZATNT**3)+(ZB*ZATNT**2)+(ZVELES*ZATNT)+RLONS
ZVELE = (3.00*ZA*ZATNT**2)+(2.00*ZB*ZATNT)+ZVELES
C** CHANGE VEL BACK TO CM/SEC
VELN = ZVELN*11094900.DO
VELE = ZVELE*(11094900.DO*DCOS(RLAT*RAD))
D
D 57 TYPE 57, RLAT, RLON, VELN, VELE
D 57 FORMAT(2X, 'LAT/LON/VN/VE=> ', 4F10.4)
C**
C** CALCULATE TIME RATIO AND TOTAL TIME DIFFERENCE FOR ERROR ESTIMATES
C**
SDIF = ZATNT/3.600E3
TDIF = ZC/3.600E3
T = SDIF/TDIF
D
D 47 TYPE 47, SDIF, TDIF, T
D 47 FORMAT(2X, 'SDIF/TDIF/T=> ', 3(F8.4, 1X))
C**
C** CHECK FOR SUMMER OR WINTER DATA
C**
IF((IDYSTN.LT.182).OR.(IDYSTN.GT.273)) GO TO 205
C**=> THIS IS SUMMER DATA
C**=> NOW CHECK FOR THE SDIF TIME BOUNDS
IF(TDIF.GT.2.00) GO TO 110
C**=> THIS IS ERROR DATA BETWEEN 1 AND 2 HOURS
LTERR=Q(.192869,-.575945E1,.700460E2,-.134647E3,.702872E2,T)
LGERR=Q(.202941,-.468376E1,.903089E2,-.179822E3,.940866E2,T)
VNERR=Q(-.264094E-1,.164596E1,-.672279E1,.976800E1,-.466455E1,T)
VEERR=Q(.190725E-1,.182885E1,-.574349E1,.761949E1,-.374149E1,T)
GO TO 300
110 IF(TDIF.GT.4.00) GO TO 120
C**=> THIS IS ERROR DATA BETWEEN 3 AND 4 HOURS
LTERR=Q(.190364E1,-.466727E2,.553386E3,-.983192E3,.474845E3,T)
LGERR=Q(.391057E1,-.105472E3,.118601E4,-.209909E4,.101307E4,T)
VNERR=Q(-.220280,-.878184E1,-.362110E2,-.544938E2,-.267458E2,T)
VEERR=Q(-.466398,.180550E2,-.748721E2,.114565E3,-.574648E2,T)
GO TO 300
120 IF(TDIF.GT.7.00) GO TO 130
C**=> THIS IS ERROR DATA BETWEEN 6 AND 7 HOURS
LTERR=Q(-.434573E1,.810672E2,.156793E4,-.335384E4,.170874E4,T)
LGERR=Q(-.406848E1,-.644965E2,.260012E4,-.513404E4,.259836E4,T)
VNERR=Q(-.168660,.223409E2,-.950057E2,.146842E3,-.745103E2,T)
VEERR=Q(.461851E-1,.212938E2,-.807473E2,.119812E3,-.606414E2,T)
GO TO 300
130 IF(TDIF.GT.13.00) GO TO 140
C**=> THIS IS ERROR DATA BETWEEN 11 AND 13 HOURS
LTERR=Q(.551924E1,-.312993E2,.945618E4,-.188342E5,.939432E4,T)
LGERR=Q(.203458E2,-.355332E3,.103268E5,-.194064E5,.940165E4,T)
VNERR=Q(-.450471,-.627998E2,-.266976E3,.413131E3,-.209935E3,T)
VEERR=Q(-.399648,.599848E2,-.249716E3,.387004E3,-.197477E3,T)
GO TO 300
140 IF(TDIF.GT.25.00) GO TO 150
C**=> THIS IS ERROR DATA BETWEEN 23 AND 25 HOURS
LTERR=Q(-.407233E2,.278504E4,.285207E4,-.116745E5,.605943E4,T)
LGERR=Q(-.170113E3,.661352E4,-.170675E5,.213869E5,-.110412E5,T)
VNERR=Q(.169221E1,.297300E2,-.644268E2,.657767E2,-.309871E2,T)
VEERR=Q(.250704E1,.164704E2,-.889819E1,-.181705E2,.106707E2,T)
GO TO 300
150 IF(TDIF.GT.50.00) GO TO 160
C**=> THIS IS ERROR DATA BETWEEN 47 AND 49 HOURS
LTERR=Q(-.429890E3,.193509E5,-.443267E5,.406707E5,-.152876E5,T)
LGERR=Q(-.341247E3,.155251E5,-.331577E5,.317635E5,-.140253E5,T)
VNERR=Q(.419435E1,.583175E2,-.252295E3,.377632E3,-.186022E3,T)
VEERR=Q(.143486E1,.854762E2,-.354166E3,.525771E3,-.256694E3,T)
GO TO 300
160 CONTINUE
C**=> NO DATA FOR TDIF GREATER THAN 50 HOURS, SET TO DEFAULT
VEERR= 9999.9

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      VNERR= 9999.9
      LGERR= 9999.9
      LTERR= 9999.9
      GO TO 300
C**=> THIS IS THE WINTER DATA SET
205 IF(TDIF .GT. 2.00) GO TO 210
C**=> THIS IS ERROR DATA BETWEEN 1 AND 2 HOURS
      LTERR=Q(.247002,-.141055E1,.239450E2,-.475730E2,.248538E2,T)
      LGERR=Q(.377059,-.408318E1,.556174E2,-.108728E3,.568677E2,T)
      VNERR=Q(.735694E-2,.658285,-.274560E1,.408656E1,-.201109E1,T)
      VEERR=Q(.214845E-1,.138559E1,-.561334E1,.830719E1,-.412921E1,T)
      GO TO 300
210 IF(TDIF .GT. 4.00) GO TO 220
C**=> THIS IS ERROR DATA BETWEEN 3 AND 4 HOURS
      LTERR=Q(.136832E1,-.282074E2,.306371E3,-.542406E3,.262633E3,T)
      LGERR=Q(.286660E1,-.795060E2,.941639E3,-.171066E4,.846418E3,T)
      VNERR=Q(-.602995E-1,.418834E1,-.178370E2,.275296E2,-.138677E2,T)
      VEERR=Q(-.284836,.133084E2,-.557777E2,.852540E2,-.476655E2,T)
      GO TO 300
220 IF(TDIF .GT. 7.00) GO TO 230
C**=> THIS IS ERROR DATA BETWEEN 6 AND 7 HOURS
      LTERR=Q(-.549117,.123283E2,.594540E3,-.118623E4,.577537E3,T)
      LGERR=Q(.504752E1,-.109335E3,.182691E4,-.340773E4,.168563E4,T)
      VNERR=Q(-.798305E-2,.646701E1,-.240102E2,.351633E2,-.176241E2,T)
      VEERR=Q(-.740555E-1,.140985E2,-.533356E2,.794973E2,-.404664E2,T)
      GO TO 300
230 IF(TDIF .GT. 13.00) GO TO 240
C**=> THIS IS ERROR DATA BETWEEN 11 AND 13 HOURS
      LTERR=Q(-.196154E1,.832318E2,.121998E4,-.251663E4,.120790E4,T)
      LGERR=Q(-.128723E2,.528756E3,-.563005E3,.169304E3,-.136860E3,T)
      VNERR=Q(-.137067,.124627E2,-.464115E2,.662067E2,-.320744E2,T)
      VEERR=Q(.305289,.113129E2,-.340711E2,.418276E2,-.187287E2,T)
      GO TO 300
240 IF(TDIF .GT. 25.00) GO TO 250
C**=> THIS IS ERROR DATA BETWEEN 23 AND 25 HOURS
      LTERR=Q(-.527531E2,.194688E4,-.397901E4,.326826E4,-.120623E4,T)
      LGERR=Q(.209375E2,.402766E3,.411796E4,-.889242E4,.435372E4,T)
      VNERR=Q(.626779,.832293E1,-.279371E2,.367508E2,-.172505E2,T)
      VEERR=Q(.728756,.208960E2,-.899374E2,.136860E3,-.682694E2,T)
      GO TO 300
250 IF(TDIF .GT. 50.00) GO TO 260
C**=> THIS IS ERROR DATA BETWEEN 47 AND 49 HOURS
      LTERR=Q(-.154057E3,.517674E4,-.147802E5,.182932E5,-.858630E4,T)
      LGERR=Q(.608849E1,.148286E4,.770615E4,-.178465E5,.865979E4,T)
      VNERR=Q(.619958,.843798E1,-.265352E2,.351965E2,-.165618E2,T)
      VEERR=Q(.110754E1,.976905E1,-.314405E2,.435897E2,-.216482E2,T)
      GO TO 300
C**=> NO DATA FOR TDIF GREATER THAN 50 HOURS, SET TO DEFAULT
260 VEERR= 9999.9
      VNERR= 9999.9
      LGERR= 9999.9
      LTERR= 9999.9
C**
C** IF THE ERROR ESTIMATE EQUATIONS PROVIDE NEGATIVE VALUES SET THEM
C** TO ZERO
C**
300 IF(LTERR .LT. 0.0) LTERR = 0.0
      IF(LGERR .LT. 0.0) LGERR = 0.0
      IF(VNERR .LT. 0.0) VNERR = 0.0
      IF(VEERR .LT. 0.0) VEERR = 0.0
D      TYPE 320, LTERR, LGERR, VNERR, VEERR
D 320 FORMAT(2X, 'LT/LG/VN//VE ERR=> ',4F10.4)
C**
C** THATS ALL FOLKS
C**
      RETURN
      END

```

APPENDIX 3

CONVERSION TABLE FOR AIDJEX DAYS TO CALENDAR DAYS

For the main experiment, AIDJEX adopted a convention of numbering days consecutively, beginning with day 1 = 01 January, 1975 and ending with day 500 = 14 May, 1976.

In the conversion table, the first column is the AIDJEX day, the second is the corresponding day of 1975 or 1976 and the third entry is the calendar date.

Appendix 3 - Conversion Table

[illegible]

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RESULTS

The following section of the data report provides all of the absolute velocity PCM data taken at camp Blue Fox during the 1975-76 Arctic Ice Dynamics Joint Experiment. Numerical listings and corresponding plots of the data are given.

PCM STATION LISTINGS

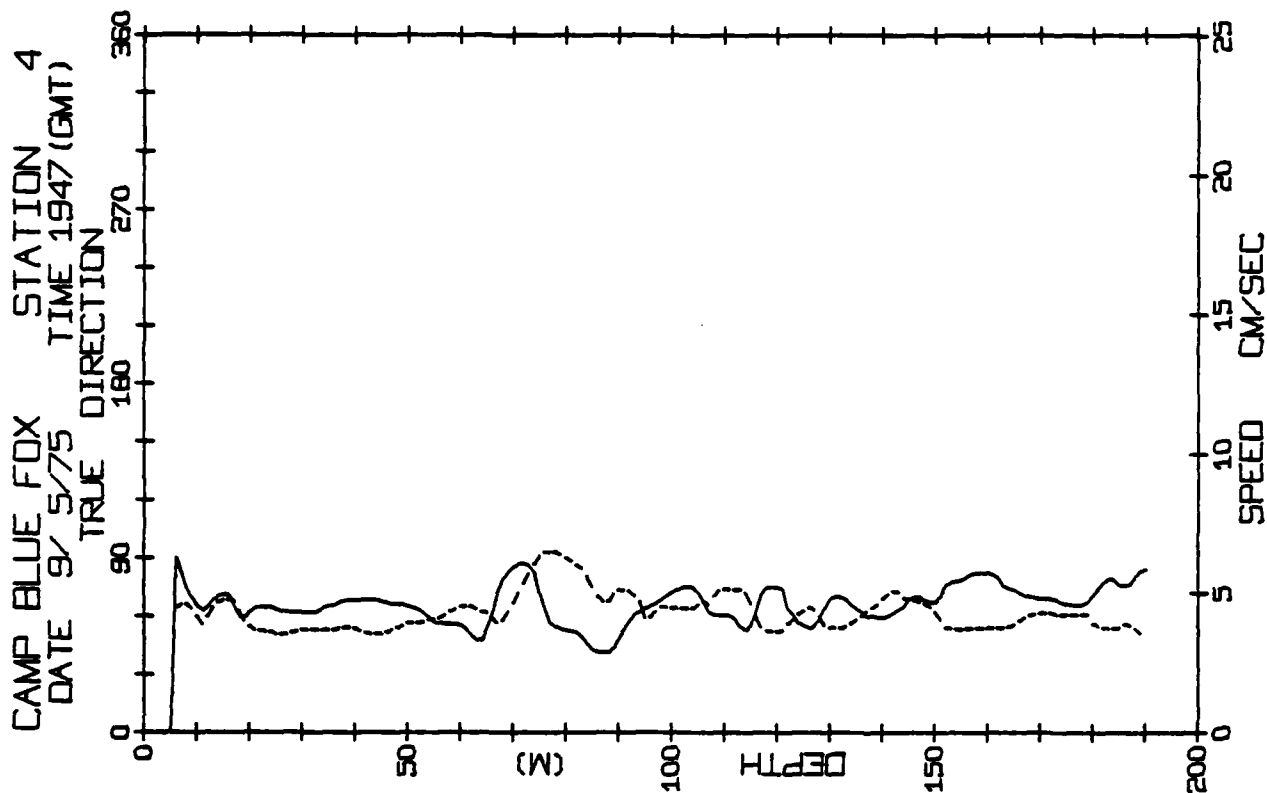
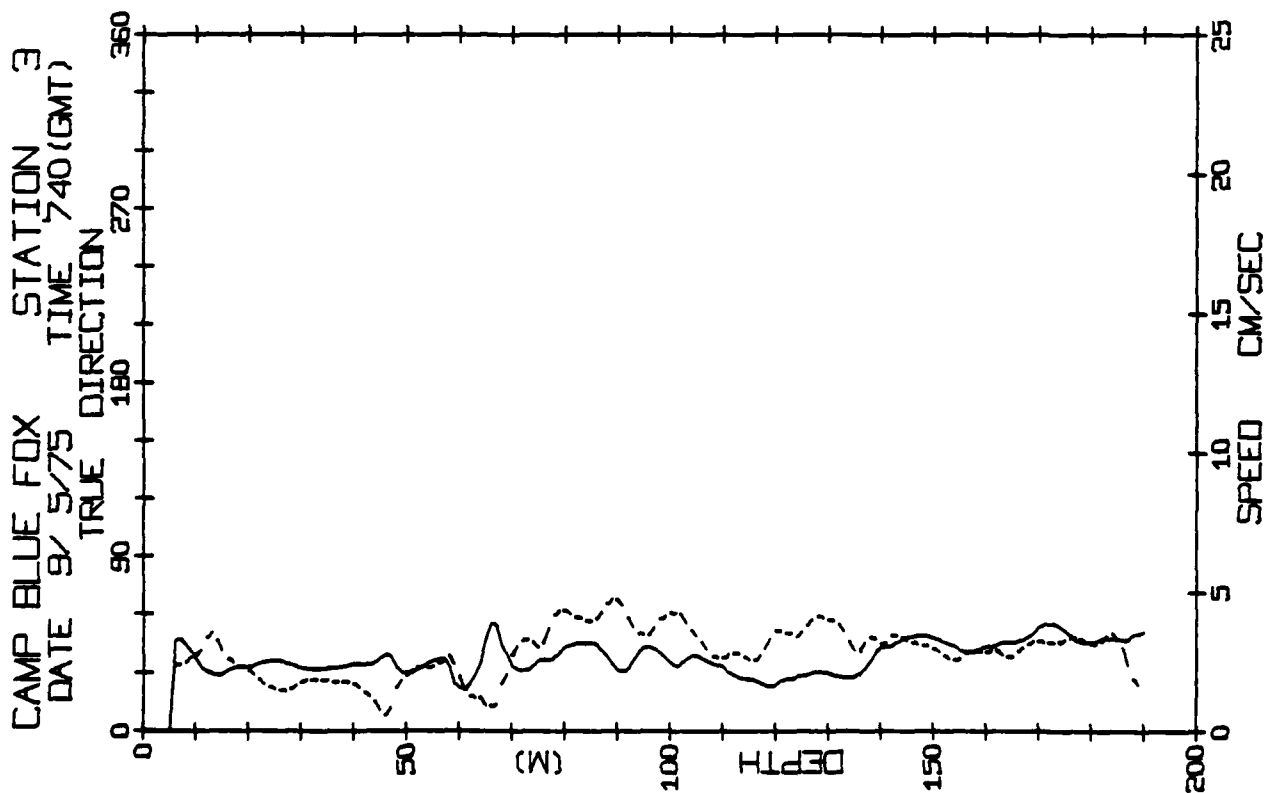
The station listing shows all stations taken at the camp along with other pertinent information. Stations that have been digitized are indicated by the word "PLOT", stations that are listed with "TSER" ("time series" or " ") were not digitized primarily due to lack of relative speeds. Parameters at the top of each page imply the following:

CAMP	Name of manned camp
STAT	PCM station
CODE	Processing code, see above
DY	day
MON	month
YR	year
TIME	GMT time of station
AJXDAY	AIDJEX day (decimal) of station, see Appendix 3
DEPTH	maximum depth (meters) obtained at station
N. VEL	north component of ice velocity (+ implies North, - implies South)
E. VEL	east component of ice velocity (+ implies East, - implies West)
LATITUDE	latitude of station in decimal degrees
LONGITUDE	longitude of station in decimal degrees (- implies West longitude)
LT. ERR	error of latitude position in meters
LG. ERR	error of longitude position in meters
VN. ERR	error in north component of ice velocity in cm/sec
VE. ERR	error in east component of ice velocity in cm/sec

CAMP	STAT	CODE	DY	MON	VR	TIME	AJXDAY	DEPTH	N. VEL	E. VEL	LATITUDE	LONGITUDE	LAT. ERR	LONG. ERR	NU. ERR	EV. ERR
BLUE	71	PLOT	12	JUN	75	21	163	192	27	42	82	146	00	00	00	10
FOX	72	PLOT	13	JUN	75	21	164	190	27	42	82	146	00	00	00	10
BLUE	73	PLOT	14	JUN	75	21	165	190	27	42	82	146	00	00	00	10
FOX	74	PLOT	14	JUN	75	21	166	190	27	42	82	146	00	00	00	10
BLUE	75	PLOT	14	JUN	75	21	167	190	27	42	82	146	00	00	00	10
FOX	76	PLOT	14	JUN	75	21	168	190	27	42	82	146	00	00	00	10
BLUE	77	PLOT	14	JUN	75	21	169	190	27	42	82	146	00	00	00	10
FOX	78	PLOT	14	JUN	75	21	170	190	27	42	82	146	00	00	00	10
BLUE	79	PLOT	14	JUN	75	21	171	190	27	42	82	146	00	00	00	10
FOX	80	PLOT	14	JUN	75	21	172	190	27	42	82	146	00	00	00	10
BLUE	81	PLOT	14	JUN	75	21	173	190	27	42	82	146	00	00	00	10
FOX	82	PLOT	14	JUN	75	21	174	190	27	42	82	146	00	00	00	10
BLUE	83	PLOT	14	JUN	75	21	175	190	27	42	82	146	00	00	00	10
FOX	84	PLOT	14	JUN	75	21	176	190	27	42	82	146	00	00	00	10
BLUE	85	PLOT	14	JUN	75	21	177	190	27	42	82	146	00	00	00	10
FOX	86	PLOT	14	JUN	75	21	178	190	27	42	82	146	00	00	00	10
BLUE	87	PLOT	14	JUN	75	21	179	190	27	42	82	146	00	00	00	10
FOX	88	PLOT	14	JUN	75	21	180	190	27	42	82	146	00	00	00	10
BLUE	89	PLOT	14	JUN	75	21	181	190	27	42	82	146	00	00	00	10
FOX	90	PLOT	14	JUN	75	21	182	190	27	42	82	146	00	00	00	10
BLUE	91	PLOT	14	JUN	75	21	183	190	27	42	82	146	00	00	00	10
FOX	92	PLOT	14	JUN	75	21	184	190	27	42	82	146	00	00	00	10
BLUE	93	PLOT	14	JUN	75	21	185	190	27	42	82	146	00	00	00	10
FOX	94	PLOT	14	JUN	75	21	186	190	27	42	82	146	00	00	00	10
BLUE	95	PLOT	14	JUN	75	21	187	190	27	42	82	146	00	00	00	10
FOX	96	PLOT	14	JUN	75	21	188	190	27	42	82	146	00	00	00	10
BLUE	97	PLOT	14	JUN	75	21	189	190	27	42	82	146	00	00	00	10
FOX	98	PLOT	14	JUN	75	21	190	190	27	42	82	146	00	00	00	10
BLUE	99	PLOT	14	JUN	75	21	191	190	27	42	82	146	00	00	00	10
FOX	100	PLOT	14	JUN	75	21	192	190	27	42	82	146	00	00	00	10
BLUE	101	PLOT	14	JUN	75	21	193	190	27	42	82	146	00	00	00	10
FOX	102	PLOT	14	JUN	75	21	194	190	27	42	82	146	00	00	00	10
BLUE	103	PLOT	14	JUN	75	21	195	190	27	42	82	146	00	00	00	10
FOX	104	PLOT	14	JUN	75	21	196	190	27	42	82	146	00	00	00	10
BLUE	105	PLOT	14	JUN	75	21	197	190	27	42	82	146	00	00	00	10
FOX	106	PLOT	14	JUN	75	21	198	190	27	42	82	146	00	00	00	10
BLUE	107	PLOT	14	JUN	75	21	199	190	27	42	82	146	00	00	00	10
FOX	108	PLOT	14	JUN	75	21	200	190	27	42	82	146	00	00	00	10
BLUE	109	PLOT	14	JUN	75	21	201	190	27	42	82	146	00	00	00	10
FOX	110	PLOT	14	JUN	75	21	202	190	27	42	82	146	00	00	00	10
BLUE	111	PLOT	14	JUN	75	21	203	190	27	42	82	146	00	00	00	10
FOX	112	PLOT	14	JUN	75	21	204	190	27	42	82	146	00	00	00	10
BLUE	113	PLOT	14	JUN	75	21	205	190	27	42	82	146	00	00	00	10
FOX	114	PLOT	14	JUN	75	21	206	190	27	42	82	146	00	00	00	10
BLUE	115	PLOT	14	JUN	75	21	207	190	27	42	82	146	00	00	00	10
FOX	116	PLOT	14	JUN	75	21	208	190	27	42	82	146	00	00	00	10
BLUE	117	PLOT	14	JUN	75	21	209	190	27	42	82	146	00	00	00	10
FOX	118	PLOT	14	JUN	75	21	210	190	27	42	82	146	00	00	00	10
BLUE	119	PLOT	14	JUN	75	21	211	190	27	42	82	146	00	00	00	10
FOX	120	PLOT	14	JUN	75	21	212	190	27	42	82	146	00	00	00	10
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FOX	122	PLOT	14	JUN	75	21	214	190	27	42	82	146	00	00	00	10
BLUE	123	PLOT	14	JUN	75	21	215	190	27	42	82	146	00	00	00	10
FOX	124	PLOT	14	JUN	75	21	216	190	27	42	82	146	00	00	00	10
BLUE	125	PLOT	14	JUN	75	21	217	190	27	42	82	146	00	00	00	10
FOX	126	PLOT	14	JUN	75	21	218	190	27	42	82	146	00	00	00	10
BLUE	127	PLOT	14	JUN	75	21	219	190	27	42	82	146	00	00	00	10
FOX	128	PLOT	14	JUN	75	21	220	190	27	42	82	146	00	00	00	10
BLUE	129	PLOT	14	JUN	75	21	221	190	27	42	82	146	00	00	00	10
FOX	130	PLOT	14	JUN	75	21	222	190	27	42	82	146	00	00	00	10
BLUE	131	PLOT	14	JUN	75	21	223	190	27	42	82	146	00	00	00	10
FOX	132	PLOT	14	JUN	75	21	224	190	27	42	82	146	00	00	00	10
BLUE	133	PLOT	14	JUN	75	21	225	190	27	42	82	146	00	00	00	10
FOX	134	PLOT	14	JUN	75	21	226	190	27	42	82	146	00	00	00	10
BLUE	135	PLOT	14	JUN	75	21	227	190	27	42	82	146	00	00	00	10
FOX	136	PLOT	14	JUN	75	21	228	190	27	42	82	146	00	00	00	10
BLUE	137	PLOT	14	JUN	75	21	229	190	27	42	82	146	00	00	00	10
FOX	138	PLOT	14	JUN	75	21	230	190	27	42	82	146	00	00	00	10
BLUE	139	PLOT	14	JUN	75	21	231	190	27	42	82	146	00	00	00	10
FOX	140	PLOT	14	JUN	75	21	232	190	27	42	82	146	00	00	00	10

CAMP	STAT	CODE	DY	MON	VR	TIME	AUXDAY	DEPTH	N. VEL	E. VEL	LATITUDE	LONGITUDE	LAT. ERR	LONG. ERR	NV. ERR	EV. ERR
UE	351	PLOT	24	OCT	7	537	297	140	1.8	0.1	73	76746	34	37	0	1
FOX	352	PLOT	25	OCT	7	211	298	180	1.8	0.1	73	76747	34	37	0	1
UE	353	PLOT	26	OCT	7	546	299	190	1.8	0.1	73	76748	34	37	0	1
FOX	354	PLOT	27	OCT	7	210	300	190	1.8	0.1	73	76749	34	37	0	1
UE	355	PLOT	28	OCT	7	508	301	190	1.8	0.1	73	76750	34	37	0	1
FOX	356	PLOT	29	OCT	7	247	302	190	1.8	0.1	73	76751	34	37	0	1
UE	357	PLOT	30	OCT	7	510	303	190	1.8	0.1	73	76752	34	37	0	1
FOX	358	PLOT	31	OCT	7	247	304	190	1.8	0.1	73	76753	34	37	0	1
UE	359	PLOT	32	OCT	7	538	305	190	1.8	0.1	73	76754	34	37	0	1
FOX	360	PLOT	33	OCT	7	247	306	190	1.8	0.1	73	76755	34	37	0	1
UE	361	PLOT	34	OCT	7	538	307	190	1.8	0.1	73	76756	34	37	0	1
FOX	362	PLOT	35	OCT	7	247	308	190	1.8	0.1	73	76757	34	37	0	1
UE	363	PLOT	36	OCT	7	538	309	190	1.8	0.1	73	76758	34	37	0	1
FOX	364	PLOT	37	OCT	7	247	310	190	1.8	0.1	73	76759	34	37	0	1
UE	365	PLOT	38	OCT	7	538	311	190	1.8	0.1	73	76760	34	37	0	1
FOX	366	PLOT	39	OCT	7	247	312	190	1.8	0.1	73	76761	34	37	0	1
UE	367	PLOT	40	OCT	7	538	313	190	1.8	0.1	73	76762	34	37	0	1
FOX	368	PLOT	41	OCT	7	247	314	190	1.8	0.1	73	76763	34	37	0	1
UE	369	PLOT	42	OCT	7	538	315	190	1.8	0.1	73	76764	34	37	0	1
FOX	370	PLOT	43	OCT	7	247	316	190	1.8	0.1	73	76765	34	37	0	1
UE	371	PLOT	44	OCT	7	538	317	190	1.8	0.1	73	76766	34	37	0	1
FOX	372	PLOT	45	OCT	7	247	318	190	1.8	0.1	73	76767	34	37	0	1
UE	373	PLOT	46	OCT	7	538	319	190	1.8	0.1	73	76768	34	37	0	1
FOX	374	PLOT	47	OCT	7	247	320	190	1.8	0.1	73	76769	34	37	0	1
UE	375	PLOT	48	OCT	7	538	321	190	1.8	0.1	73	76770	34	37	0	1
FOX	376	PLOT	49	OCT	7	247	322	190	1.8	0.1	73	76771	34	37	0	1
UE	377	PLOT	50	OCT	7	538	323	190	1.8	0.1	73	76772	34	37	0	1
FOX	378	PLOT	51	OCT	7	247	324	190	1.8	0.1	73	76773	34	37	0	1
UE	379	PLOT	52	OCT	7	538	325	190	1.8	0.1	73	76774	34	37	0	1
FOX	380	PLOT	53	OCT	7	247	326	190	1.8	0.1	73	76775	34	37	0	1
UE	381	PLOT	54	OCT	7	538	327	190	1.8	0.1	73	76776	34	37	0	1
FOX	382	PLOT	55	OCT	7	247	328	190	1.8	0.1	73	76777	34	37	0	1
UE	383	PLOT	56	OCT	7	538	329	190	1.8	0.1	73	76778	34	37	0	1
FOX	384	PLOT	57	OCT	7	247	330	190	1.8	0.1	73	76779	34	37	0	1
UE	385	PLOT	58	OCT	7	538	331	190	1.8	0.1	73	76780	34	37	0	1
FOX	386	PLOT	59	OCT	7	247	332	190	1.8	0.1	73	76781	34	37	0	1
UE	387	PLOT	60	OCT	7	538	333	190	1.8	0.1	73	76782	34	37	0	1
FOX	388	PLOT	61	OCT	7	247	334	190	1.8	0.1	73	76783	34	37	0	1
UE	389	PLOT	62	OCT	7	538	335	190	1.8	0.1	73	76784	34	37	0	1
FOX	390	PLOT	63	OCT	7	247	336	190	1.8	0.1	73	76785	34	37	0	1
UE	391	PLOT	64	OCT	7	538	337	190	1.8	0.1	73	76786	34	37	0	1
FOX	392	PLOT	65	OCT	7	247	338	190	1.8	0.1	73	76787	34	37	0	1
UE	393	PLOT	66	OCT	7	538	339	190	1.8	0.1	73	76788	34	37	0	1
FOX	394	PLOT	67	OCT	7	247	340	190	1.8	0.1	73	76789	34	37	0	1
UE	395	PLOT	68	OCT	7	538	341	190	1.8	0.1	73	76790	34	37	0	1
FOX	396	PLOT	69	OCT	7	247	342	190	1.8	0.1	73	76791	34	37	0	1
UE	397	PLOT	70	OCT	7	538	343	190	1.8	0.1	73	76792	34	37	0	1
FOX	398	PLOT	71	OCT	7	247	344	190	1.8	0.1	73	76793	34	37	0	1
UE	399	PLOT	72	OCT	7	538	345	190	1.8	0.1	73	76794	34	37	0	1
FOX	400	PLOT	73	OCT	7	247	346	190	1.8	0.1	73	76795	34	37	0	1
UE	401	PLOT	74	OCT	7	538	347	190	1.8	0.1	73	76796	34	37	0	1
FOX	402	PLOT	75	OCT	7	247	348	190	1.8	0.1	73	76797	34	37	0	1
UE	403	PLOT	76	OCT	7	538	349	190	1.8	0.1	73	76798	34	37	0	1
FOX	404	PLOT	77	OCT	7	247	350	190	1.8	0.1	73	76799	34	37	0	1
UE	405	PLOT	78	OCT	7	538	351	190	1.8	0.1	73	76800	34	37	0	1
FOX	406	PLOT	79	OCT	7	247	352	190	1.8	0.1	73	76801	34	37	0	1
UE	407	PLOT	80	OCT	7	538	353	190	1.8	0.1	73	76802	34	37	0	1
FOX	408	PLOT	81	OCT	7	247	354	190	1.8	0.1	73	76803	34	37	0	1
UE	409	PLOT	82	OCT	7	538	355	190	1.8	0.1	73	76804	34	37	0	1
FOX	410	PLOT	83	OCT	7	247	356	190	1.8	0.1	73	76805	34	37	0	1
UE	411	PLOT	84	OCT	7	538	357	190	1.8	0.1	73	76806	34	37	0	1
FOX	412	PLOT	85	OCT	7	247	358	190	1.8	0.1	73	76807	34	37	0	1
UE	413	PLOT	86	OCT	7	538	359	190	1.8	0.1	73	76808	34	37	0	1
FOX	414	PLOT	87	OCT	7	247	360	190	1.8	0.1	73	76809	34	37	0	1
UE	415	PLOT	88	OCT	7	538	361	190	1.8	0.1	73	76810	34	37	0	1
FOX	416	PLOT	89	OCT	7	247	362	190	1.8	0.1	73	76811	34	37	0	1
UE	417	PLOT	90	OCT	7	538	363	190	1.8	0.1	73	76812	34	37	0	1
FOX	418	PLOT	91	OCT	7	247	364	190	1.8	0.1	73	76813	34	37	0	1
UE	419	PLOT	92	OCT	7	538	365	190	1.8	0.1	73	76814	34	37	0	1
FOX	420	PLOT	93	OCT	7	247	366	190	1.8	0.1	73	76815	34	37	0	1

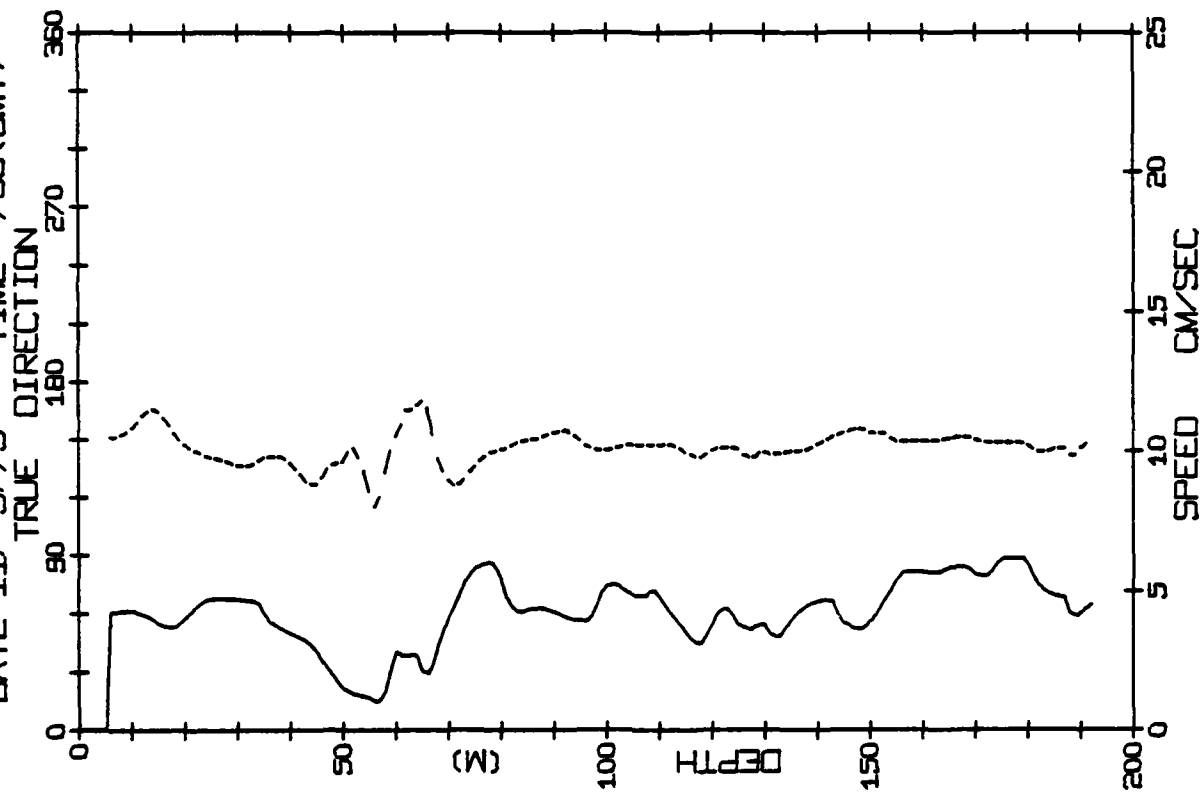
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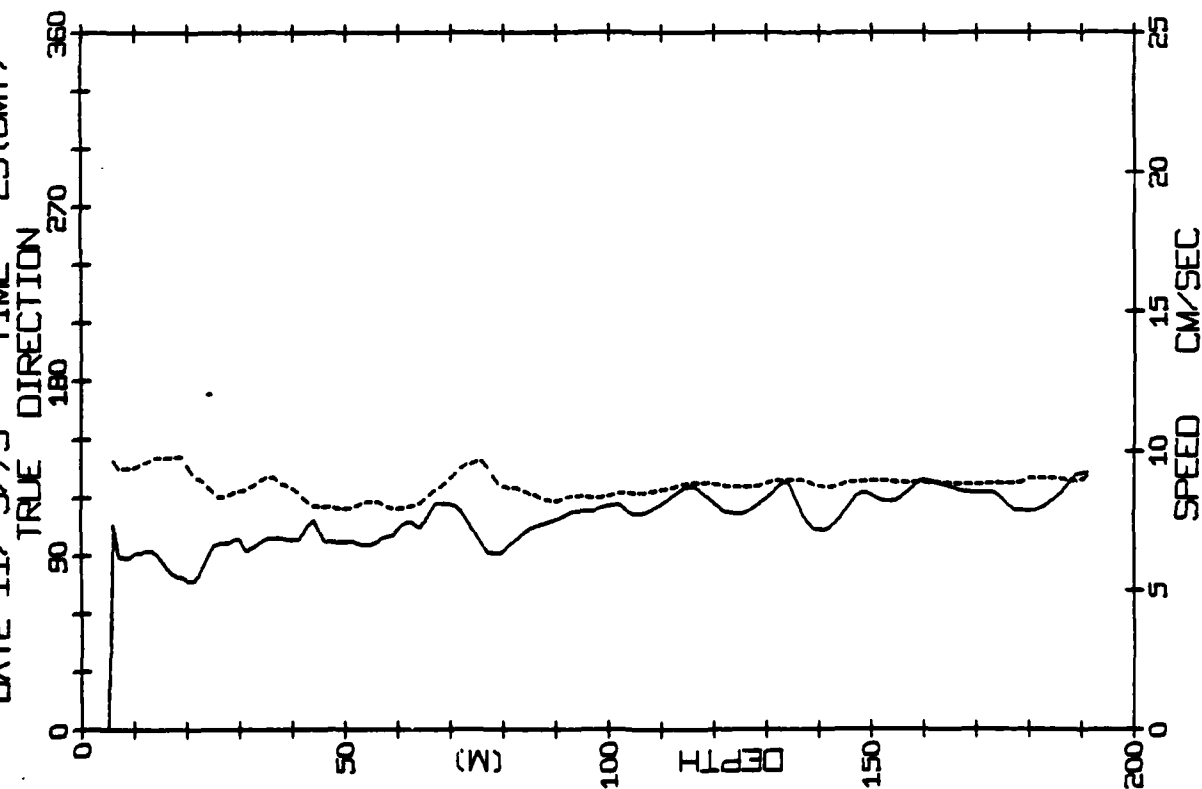
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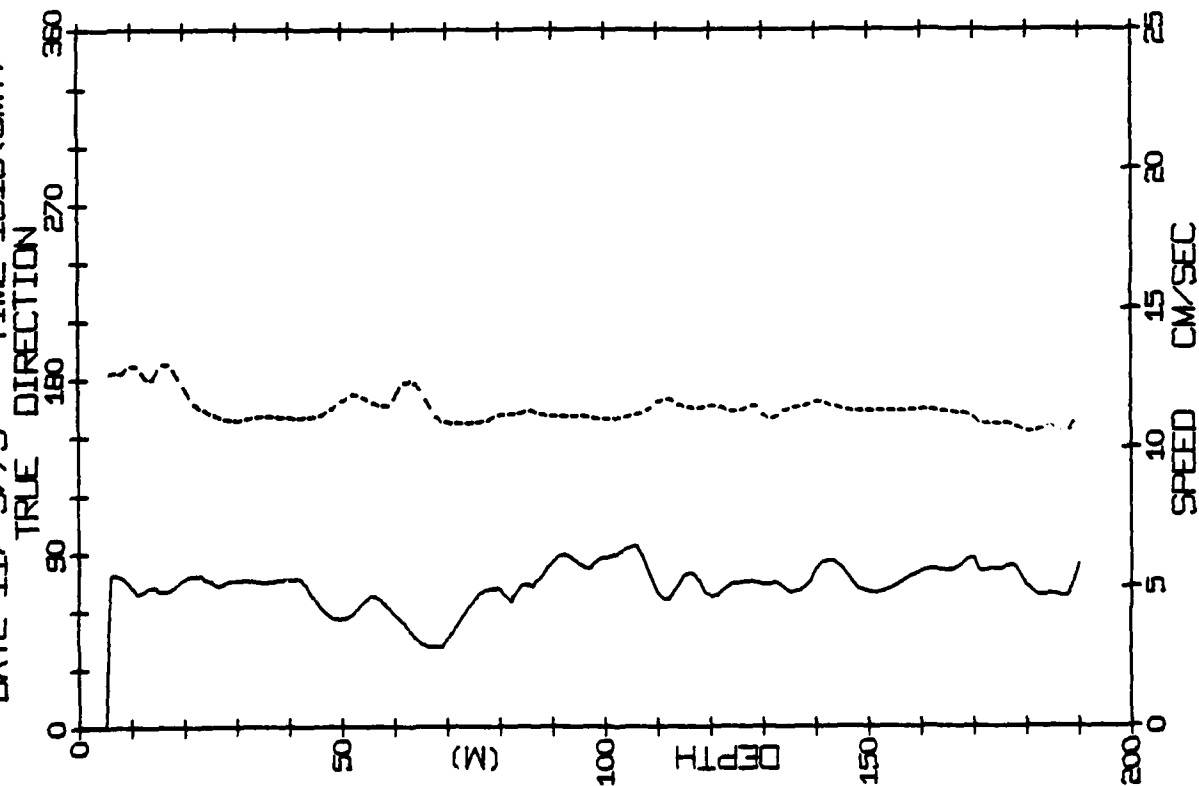
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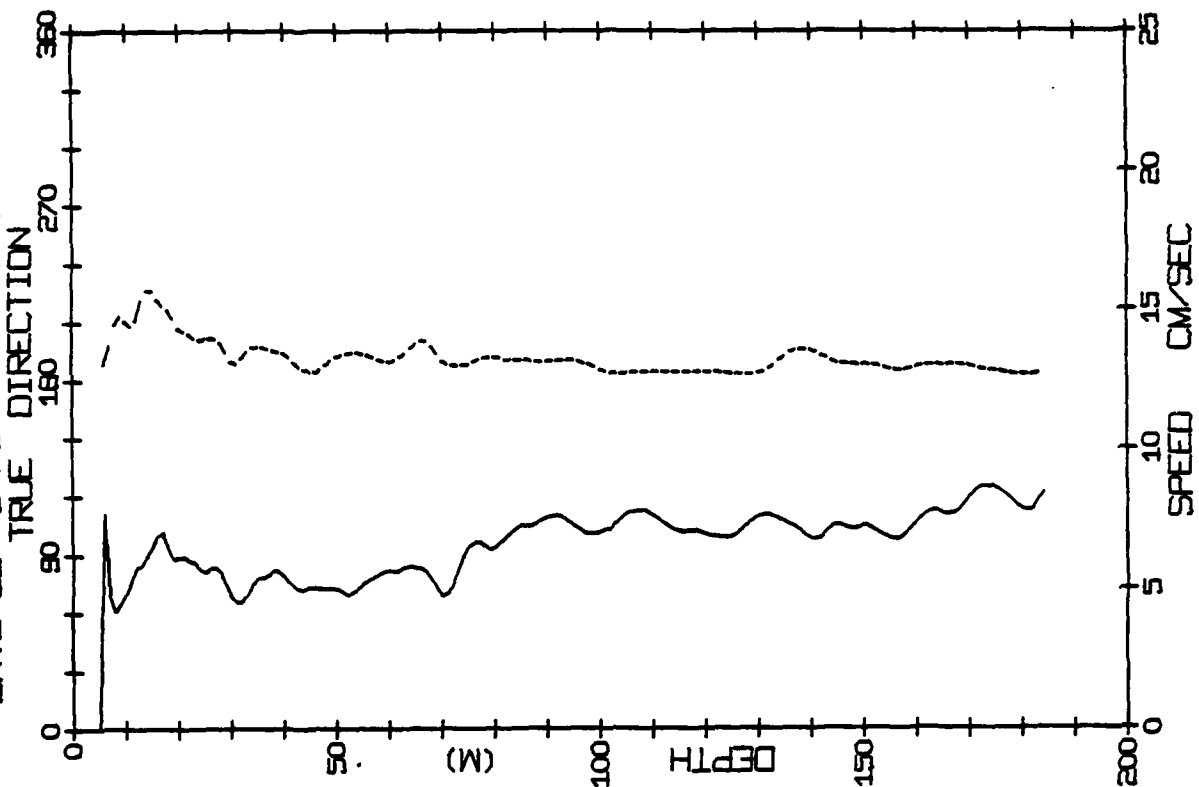
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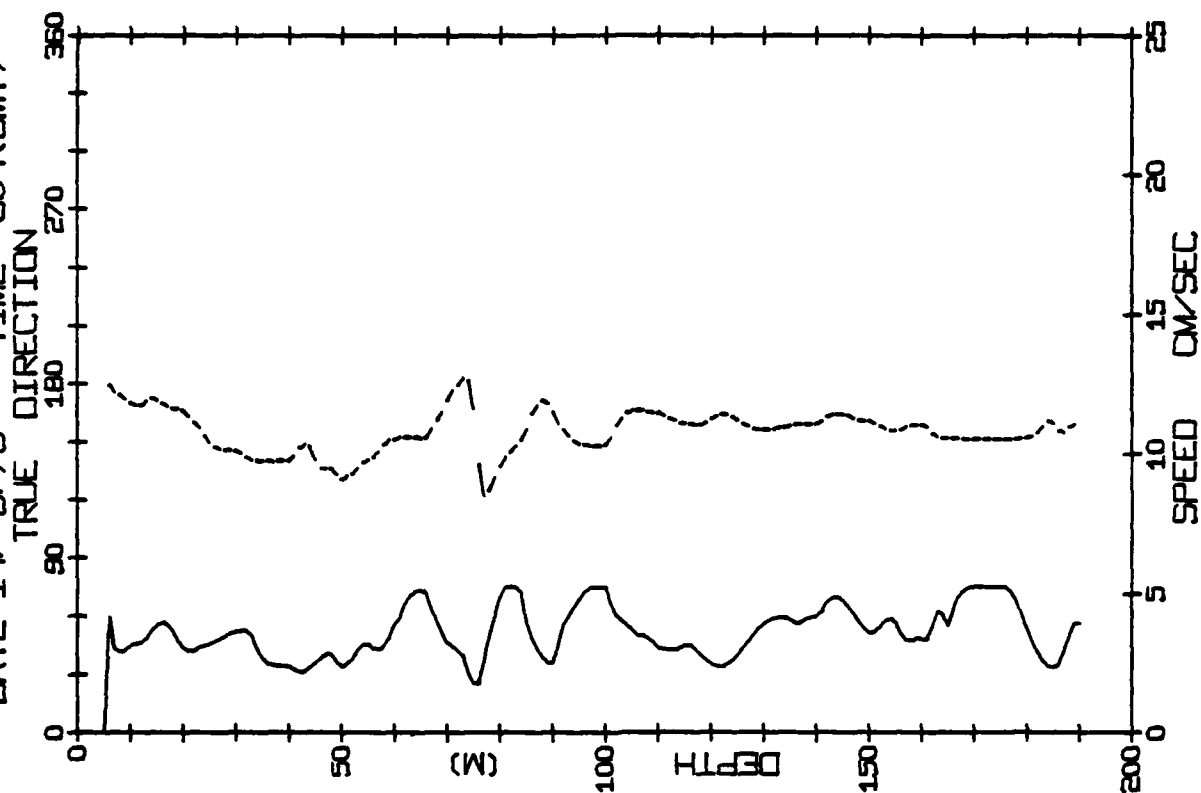
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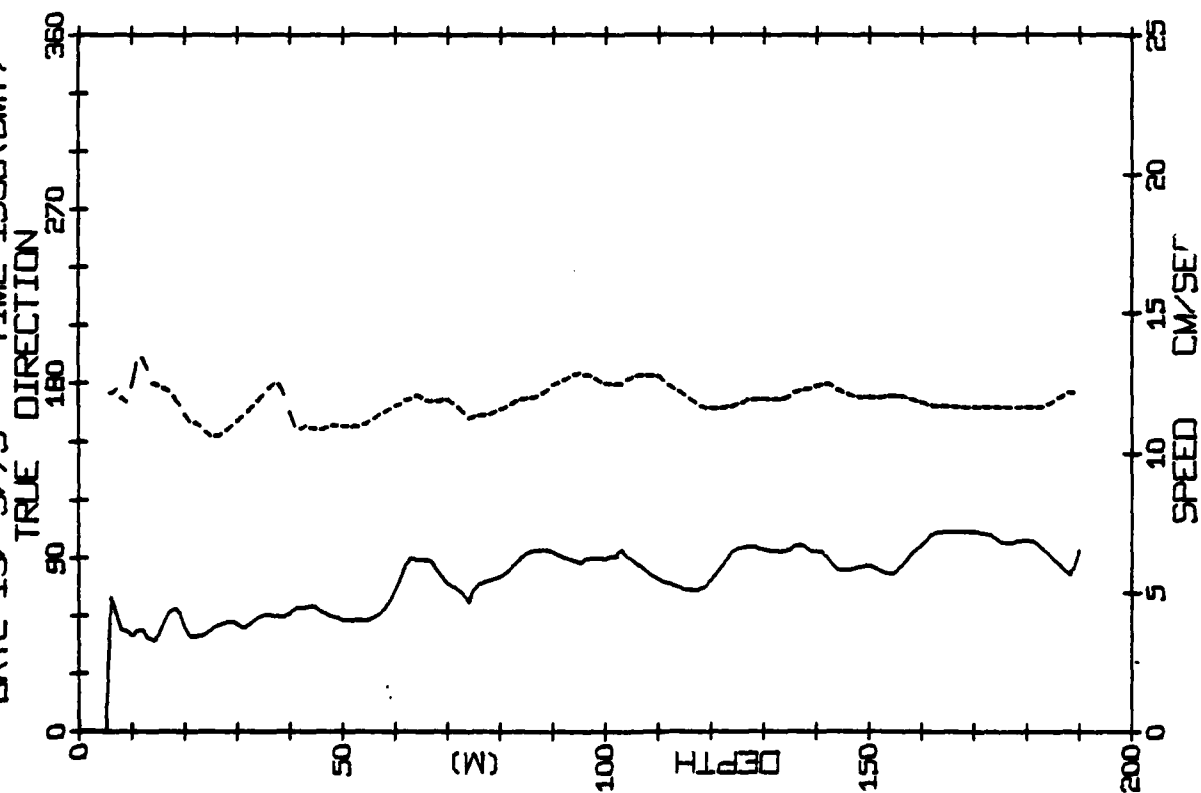
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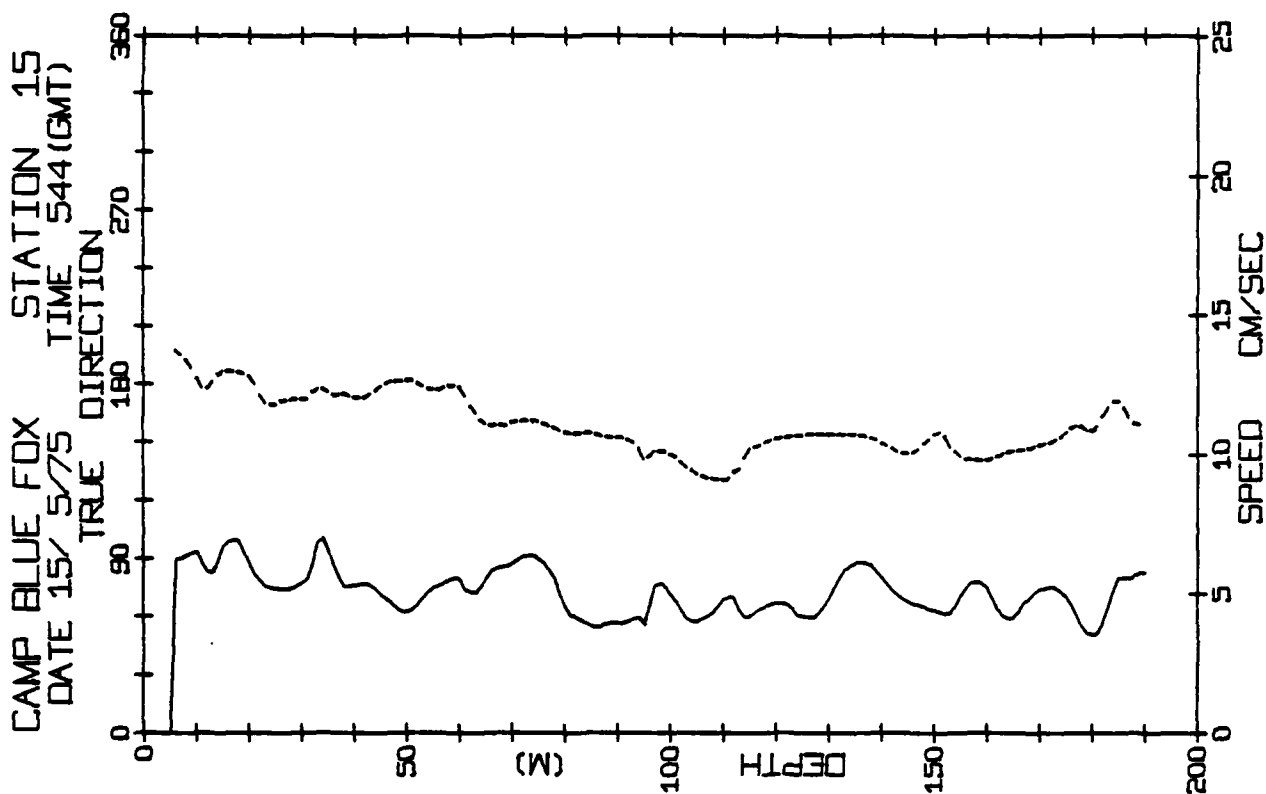
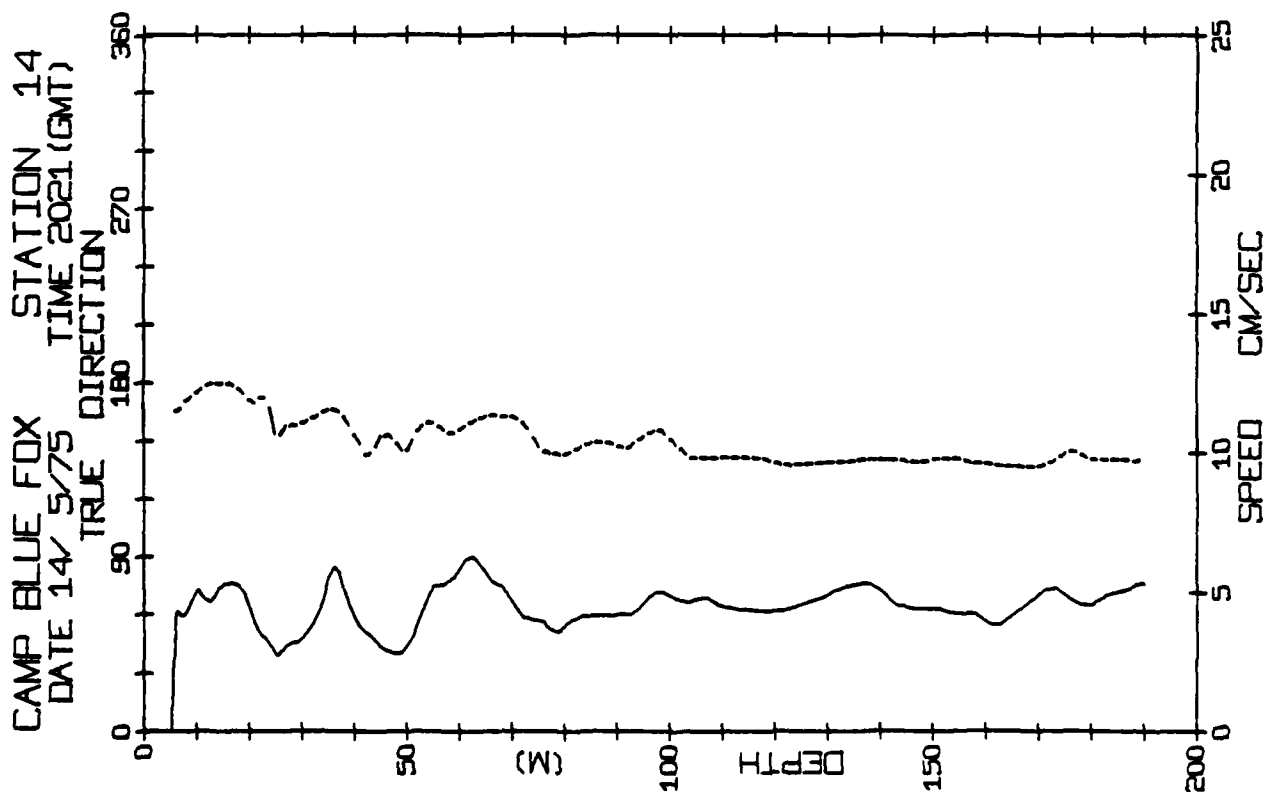


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DATE 14/ 5/75 TIME 804(GMT)

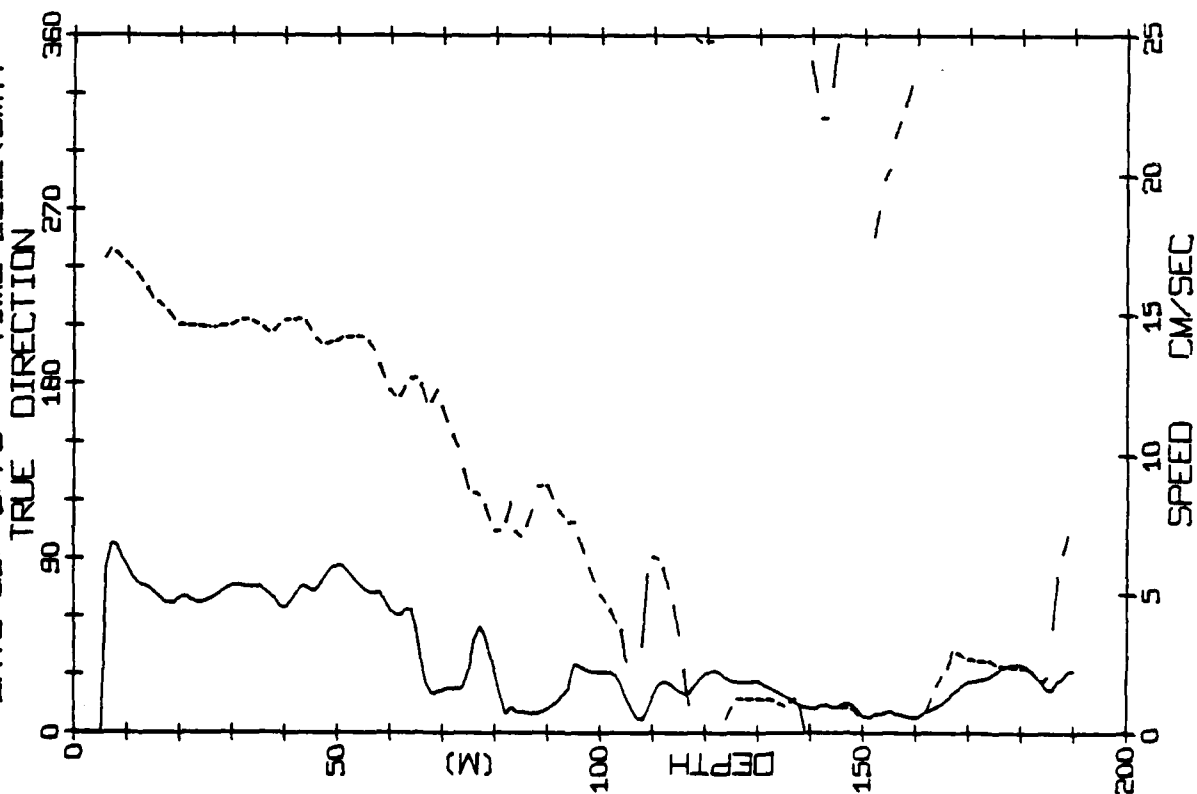


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DATE 13/ 5/75 TIME 1938(GMT)

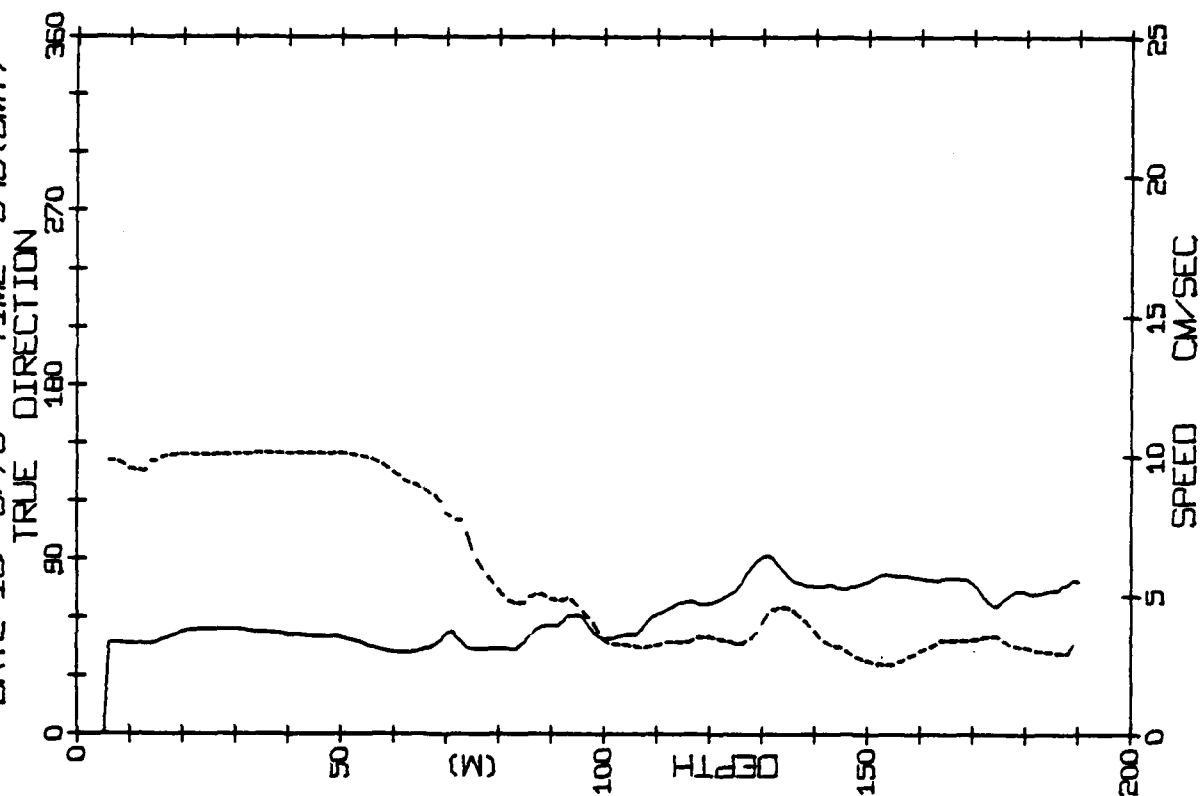




CAMP BLUE FOX STATION 16
DATE 15/ 5/75 TIME 2112(GMT)



CAMP BLUE FOX STATION 17
DATE 16/ 5/75 TIME 549(GMT)



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LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

F/B 8/3

ARCTIC ICE DYNAMICS JOINT EXPERIMENT 1975-1976, PHYSICAL OCEANO--ETC(U)

FEB 80 T O MANLEY, K HUNKINS, W TIEMANN

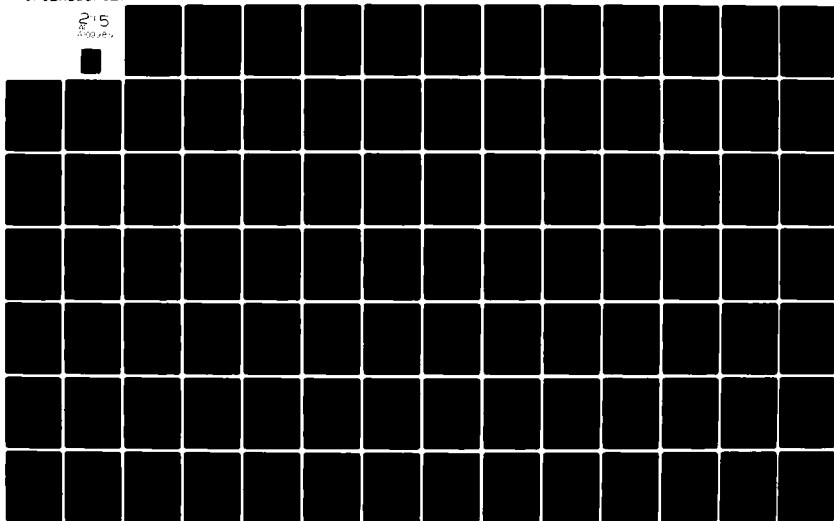
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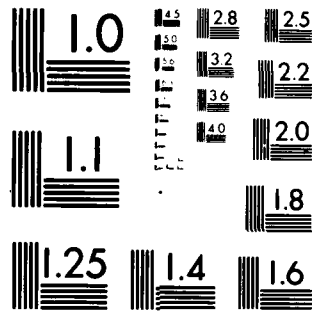
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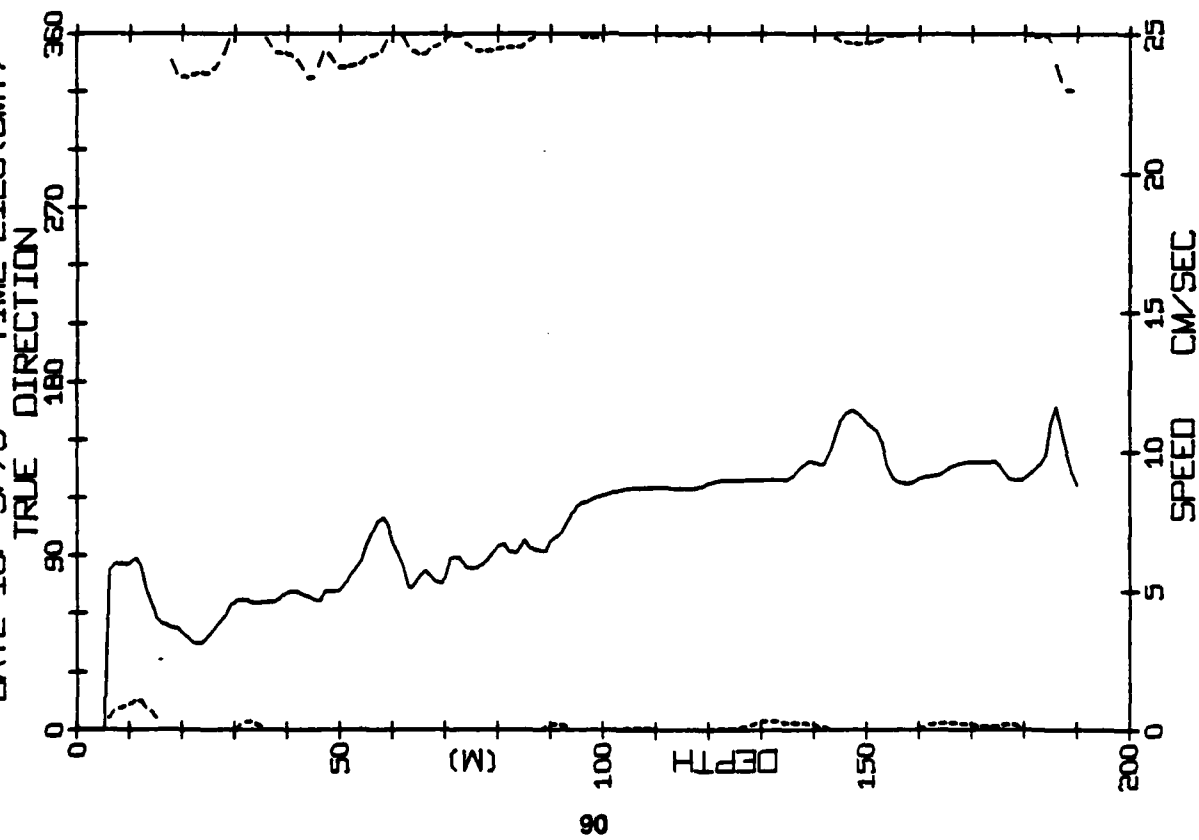
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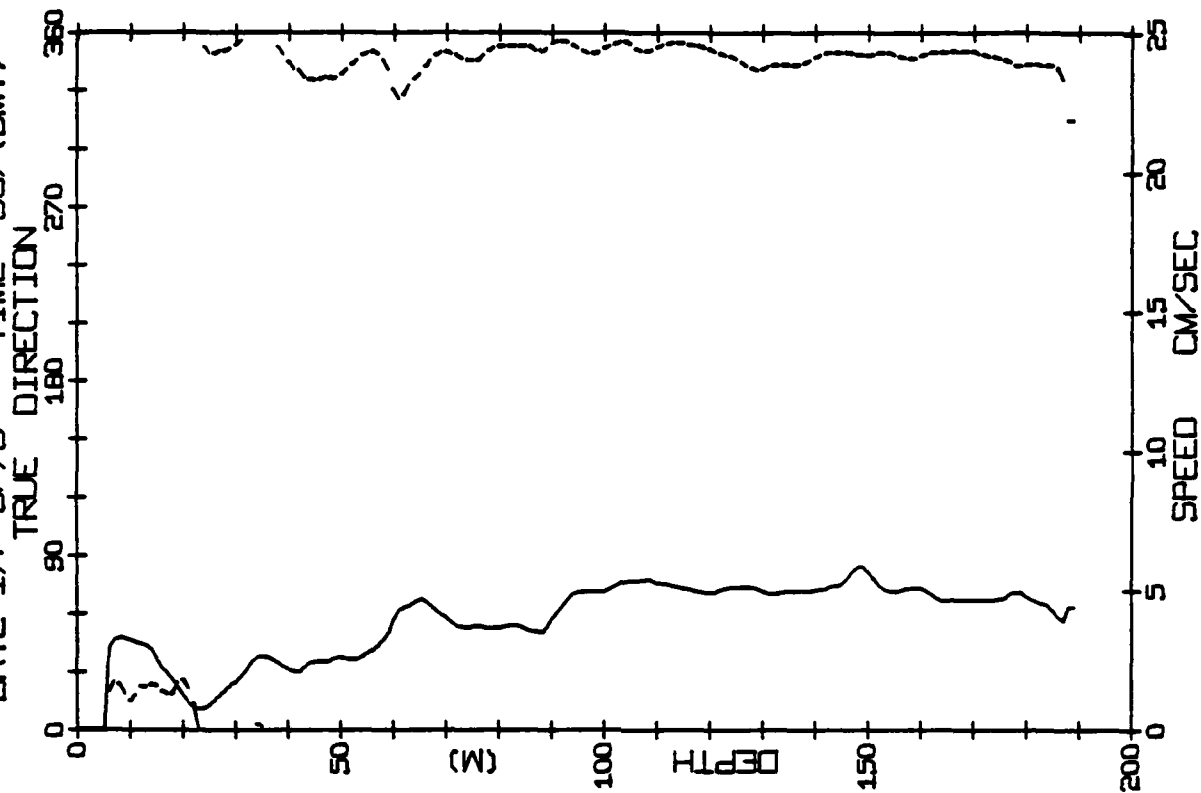


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

CAMP BLUE FOX STATION 18
DATE 16/ 5/75 TIME 2126(GMT)



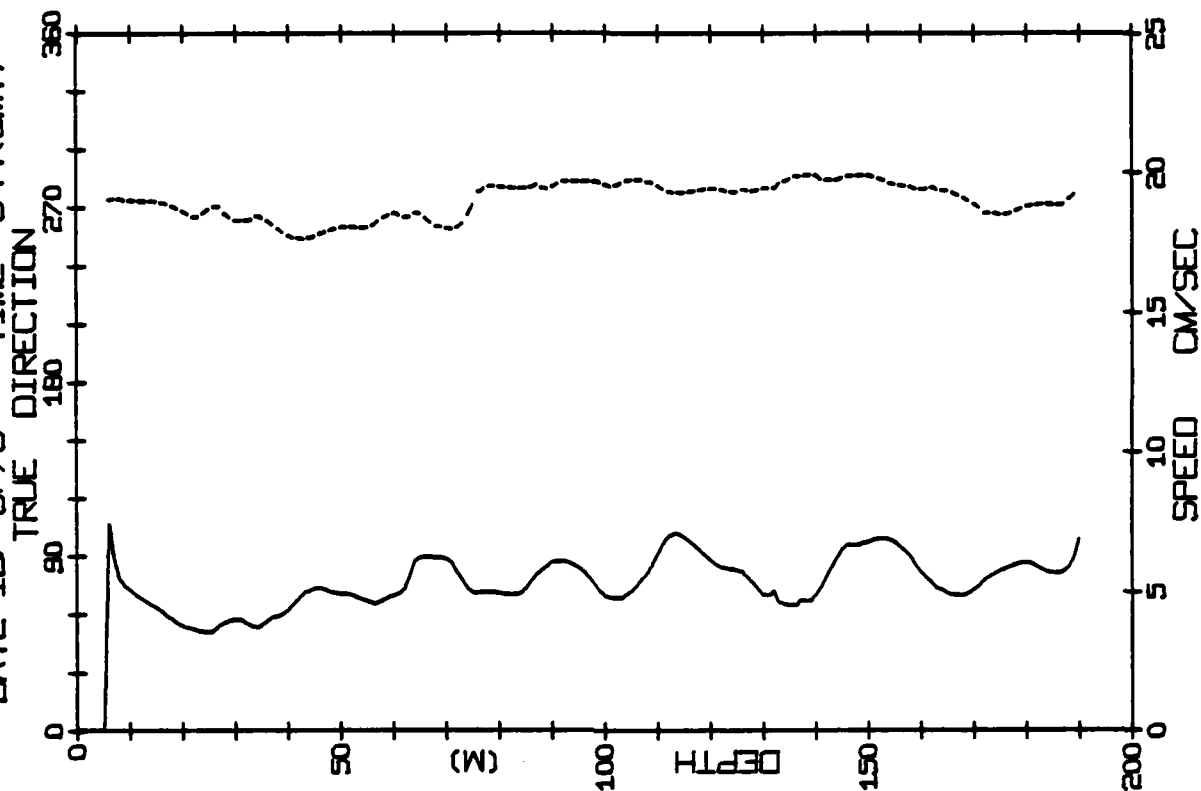
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DATE 17/ 5/75 TIME 537(GMT)



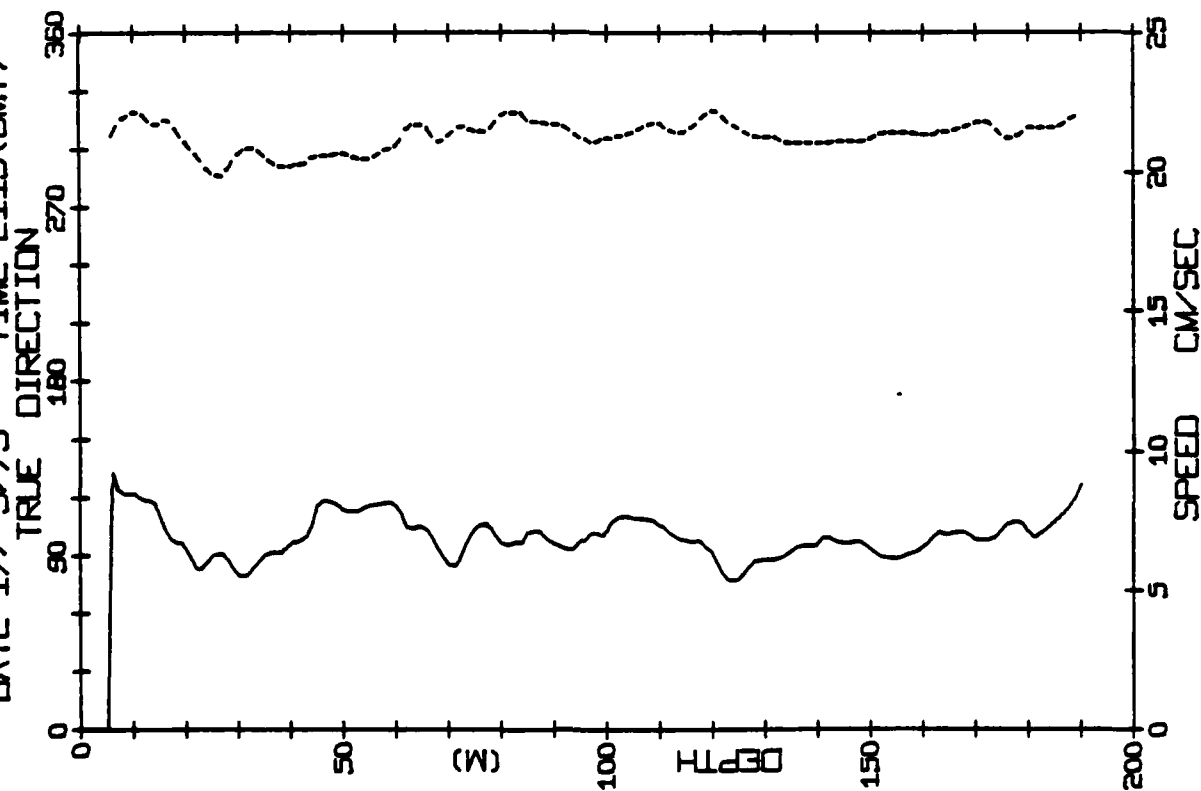
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CAMP BLUE FOX STATION 21
DATE 18/ 5/75 TIME 544(GMT)



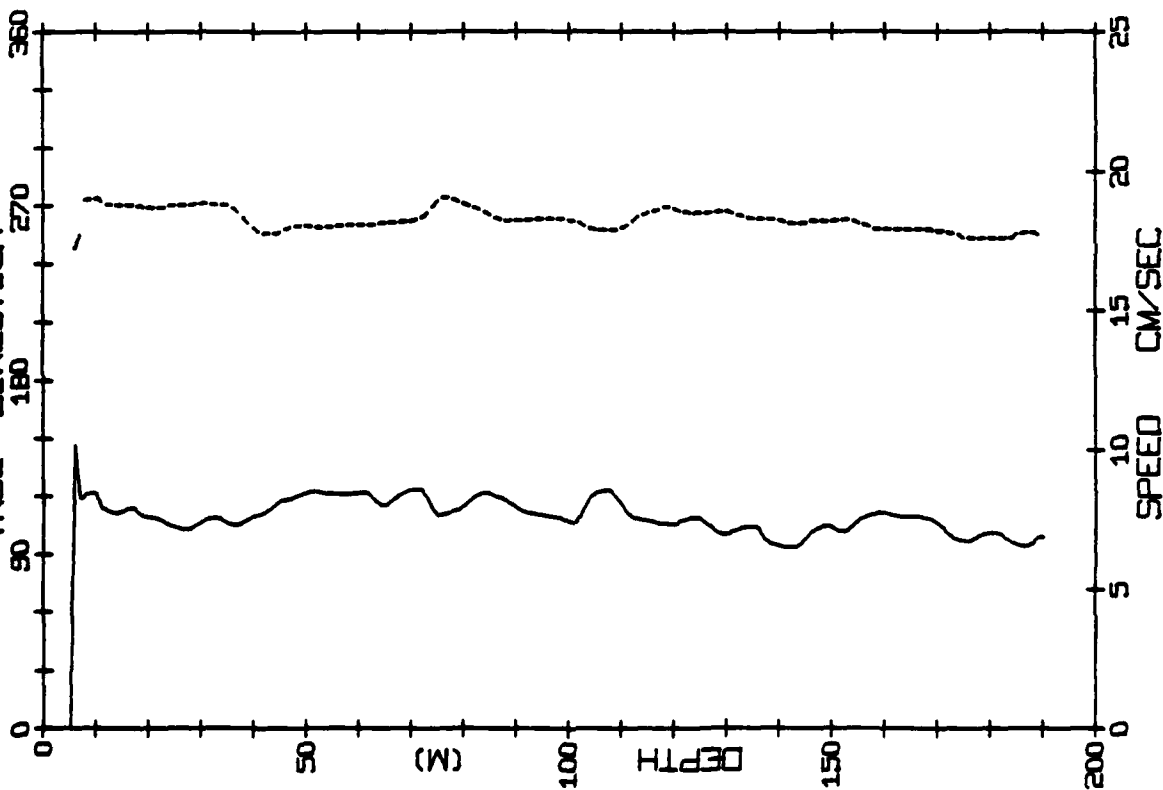
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DATE 17/ 5/75 TIME 2115(GMT)



CAMP BLUE FOX
DATE 18/ 5/75

STATION 22
TIME 2120(GMT)

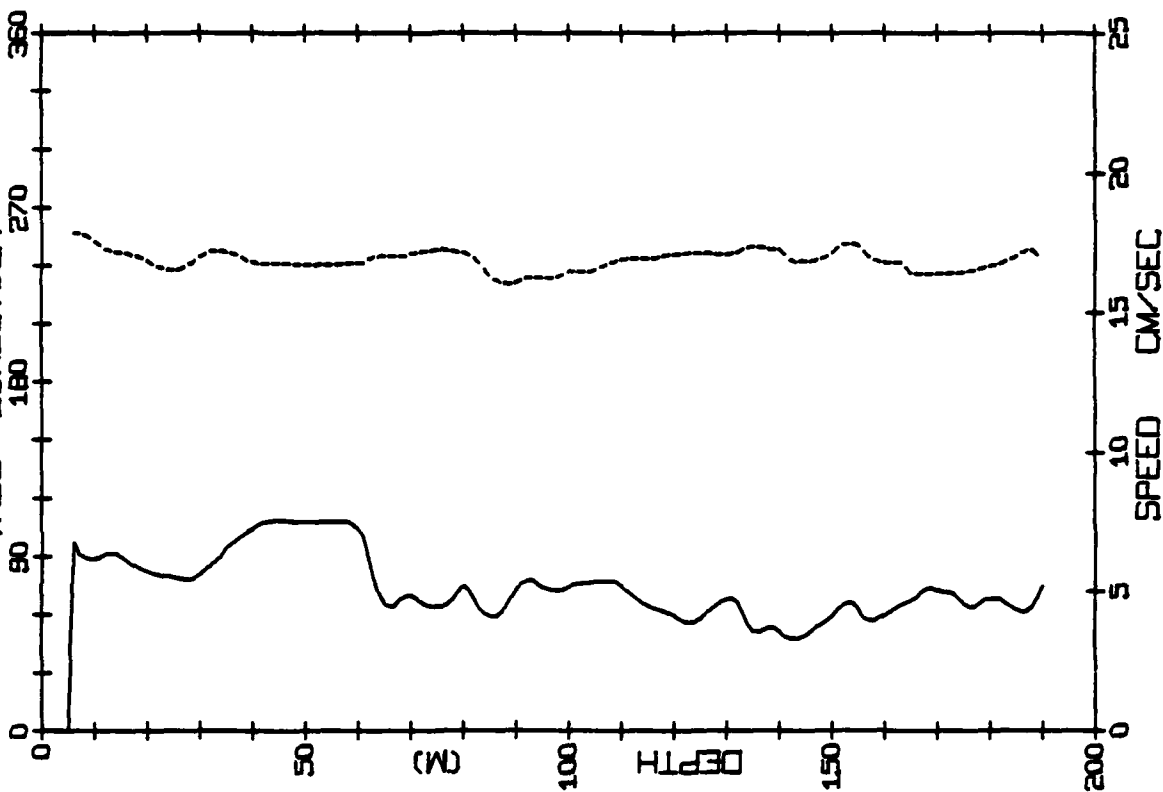
TRUE DIRECTION



CAMP BLUE FOX
DATE 19/ 5/75

STATION 24
TIME 2113(GMT)

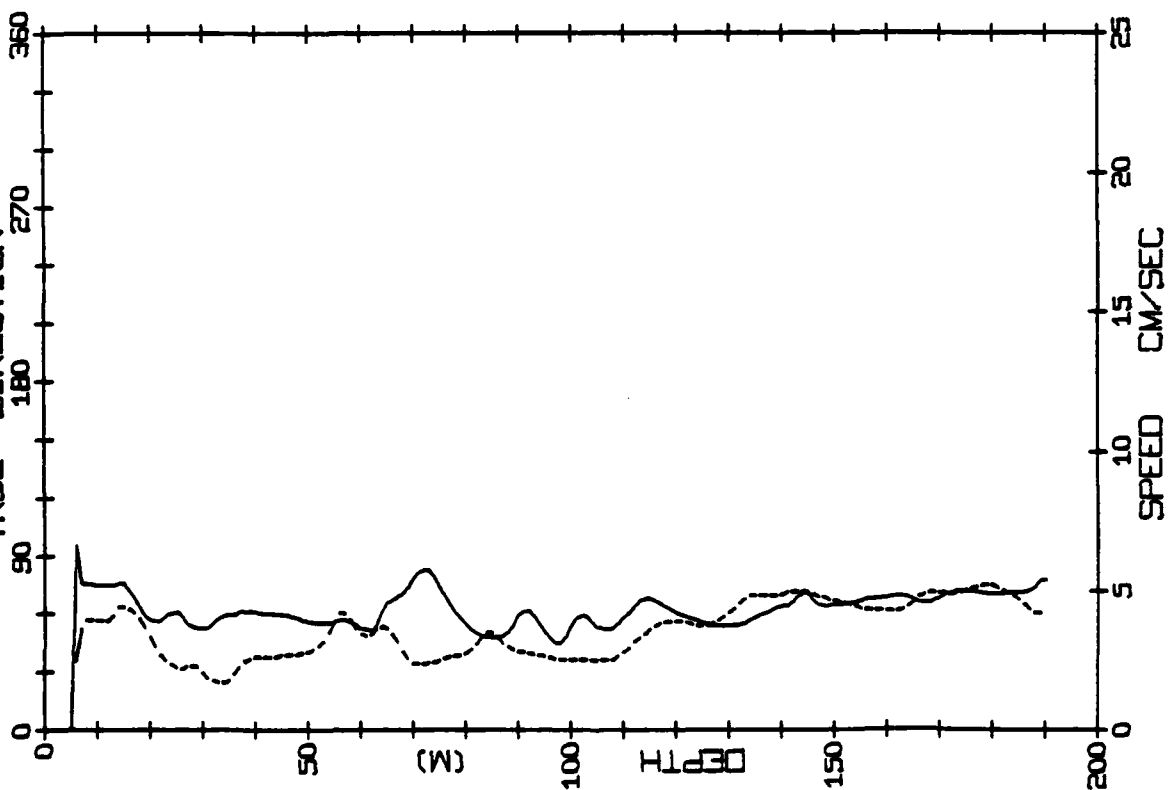
TRUE DIRECTION



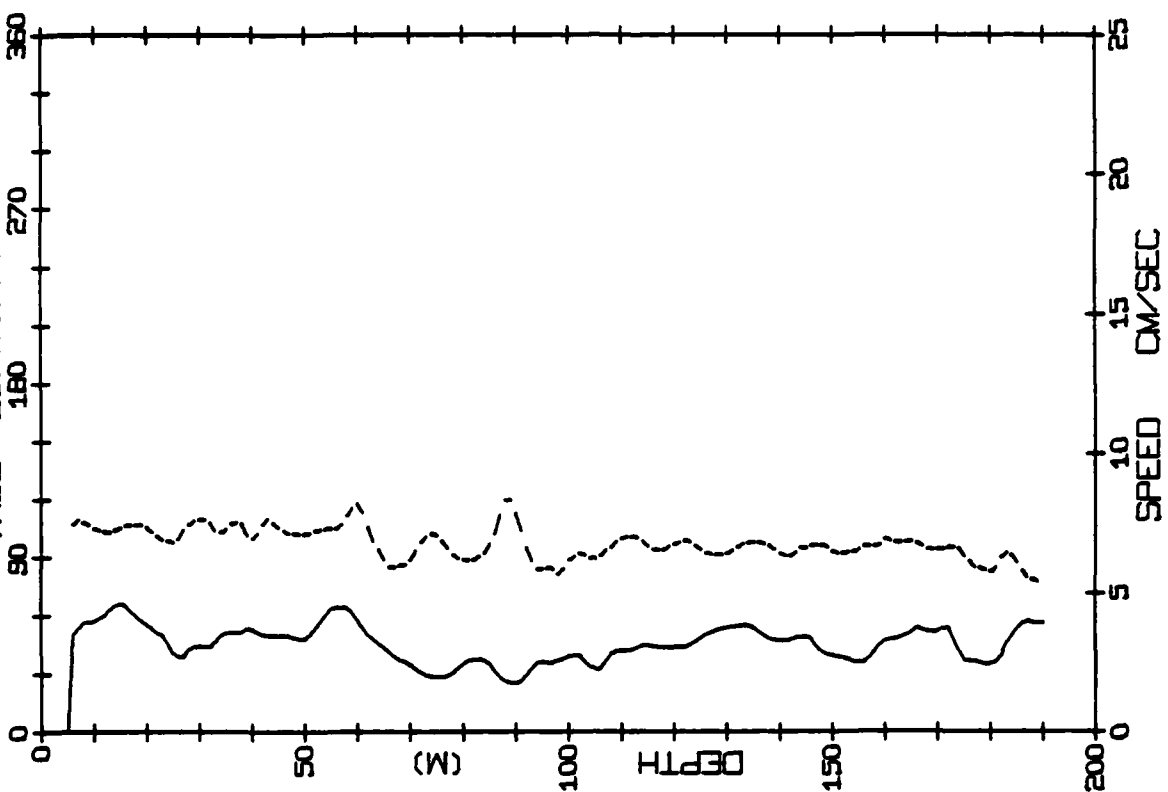
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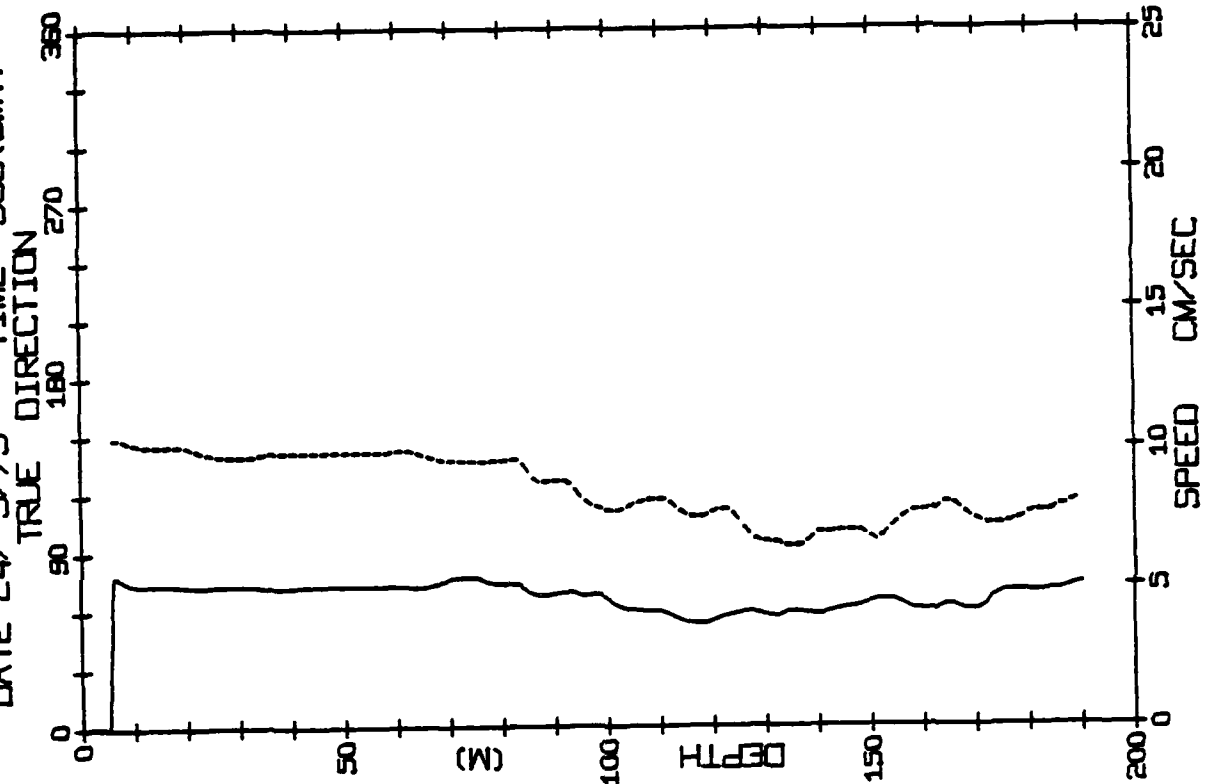
CAMP BLUE FOX STATION 28
DATE 21/ 5/75 TIME 2122(GMT)
TRUE DIRECTION



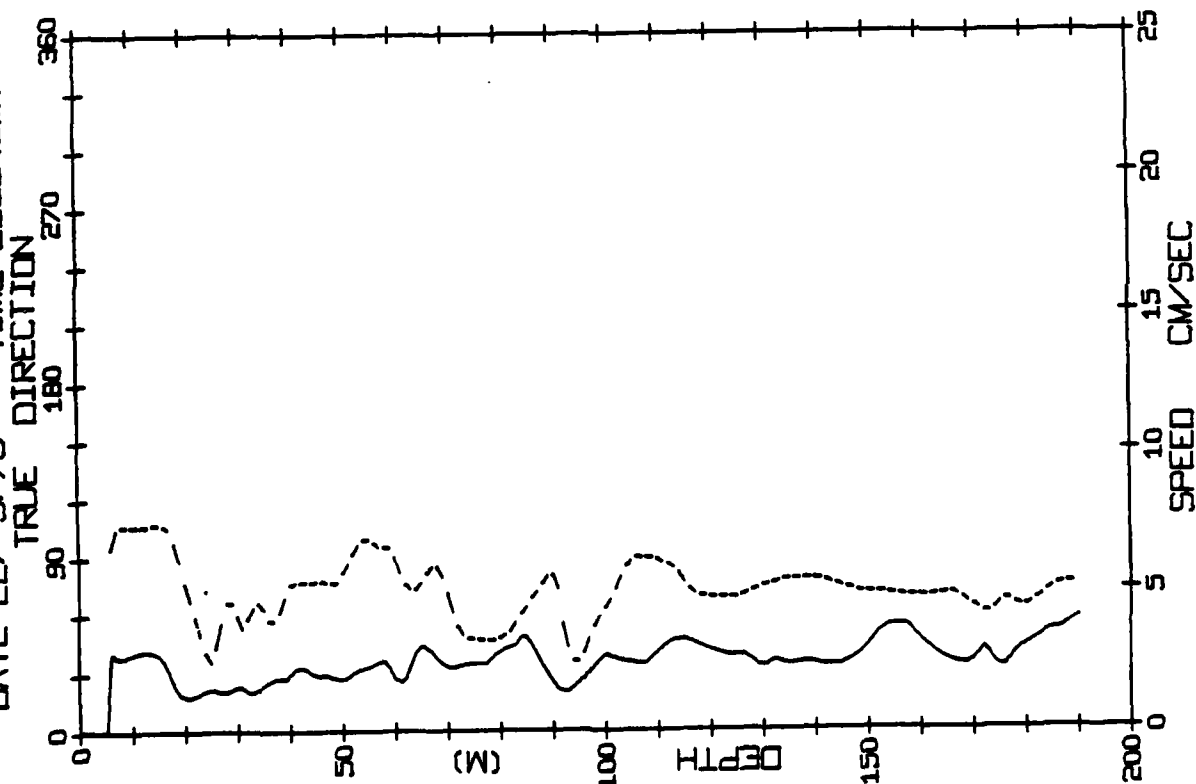
CAMP BLUE FOX STATION 29
DATE 22/ 5/75 TIME 542(GMT)
TRUE DIRECTION

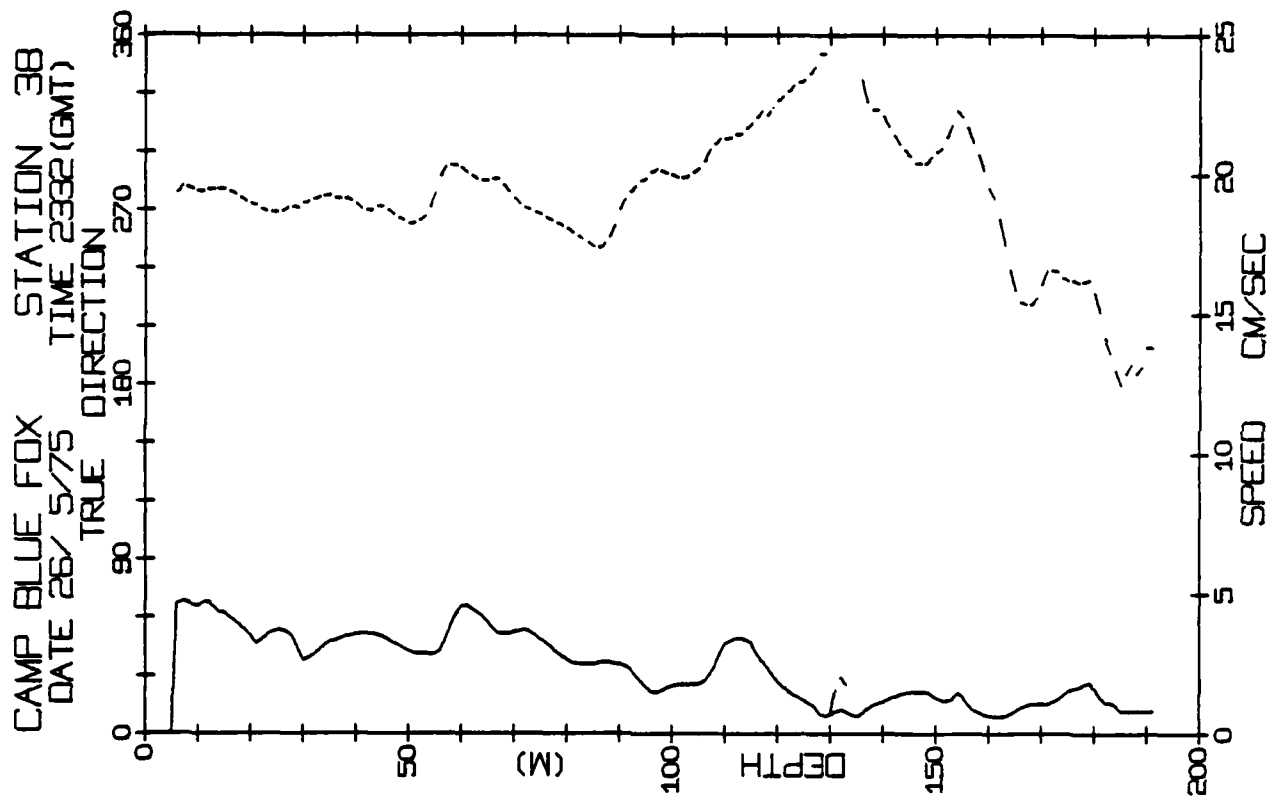
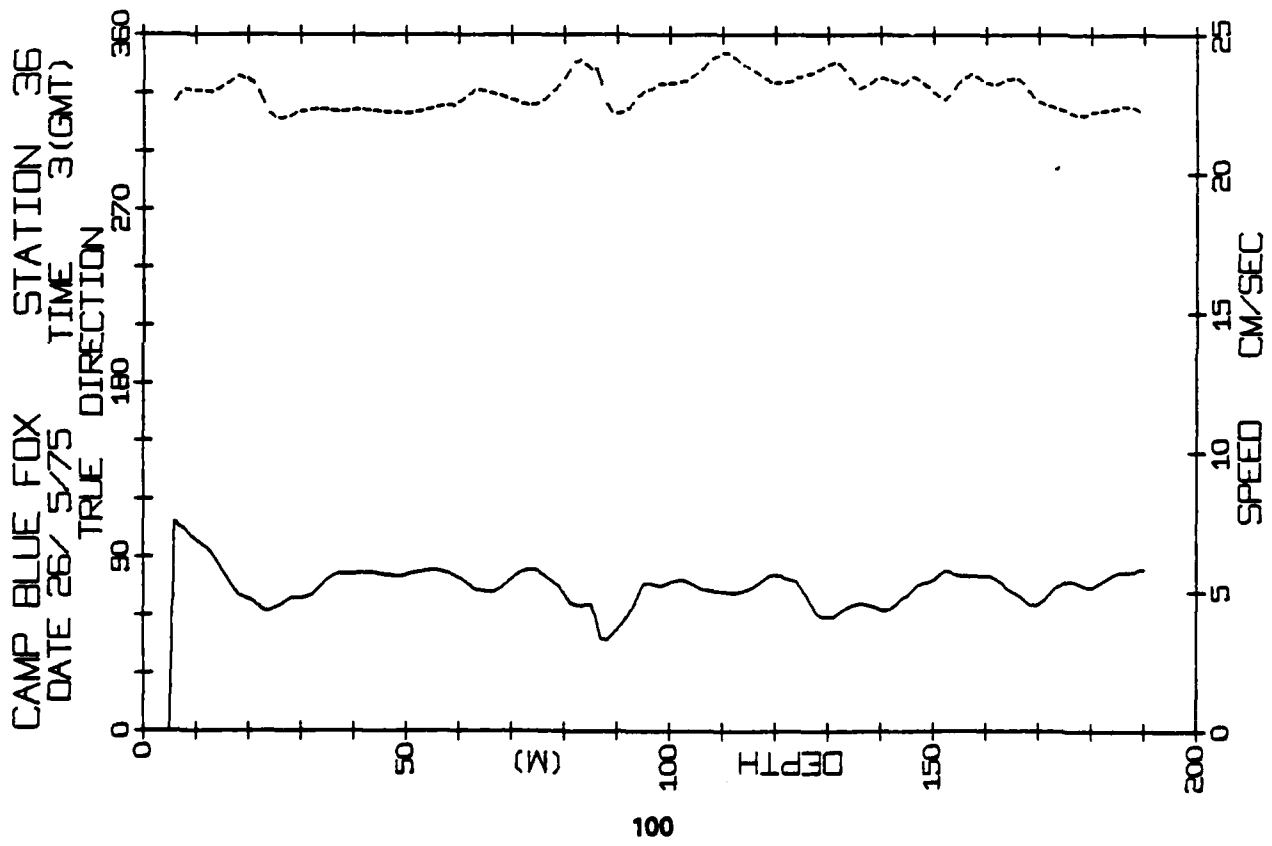


CAMP BLUE FOX STATION 33
DATE 24/ 5/75 TIME 536(GMT)

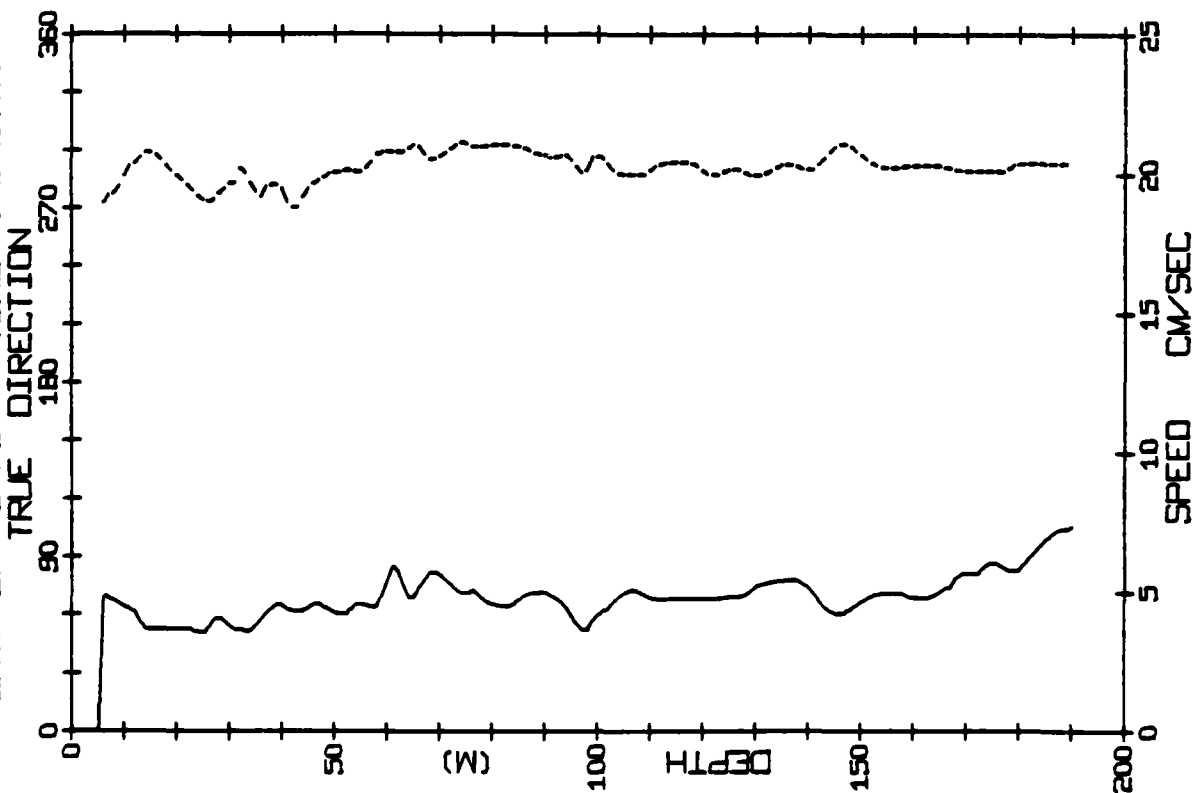


CAMP BLUE FOX STATION 30
DATE 22/ 5/75 TIME 2111(GMT)

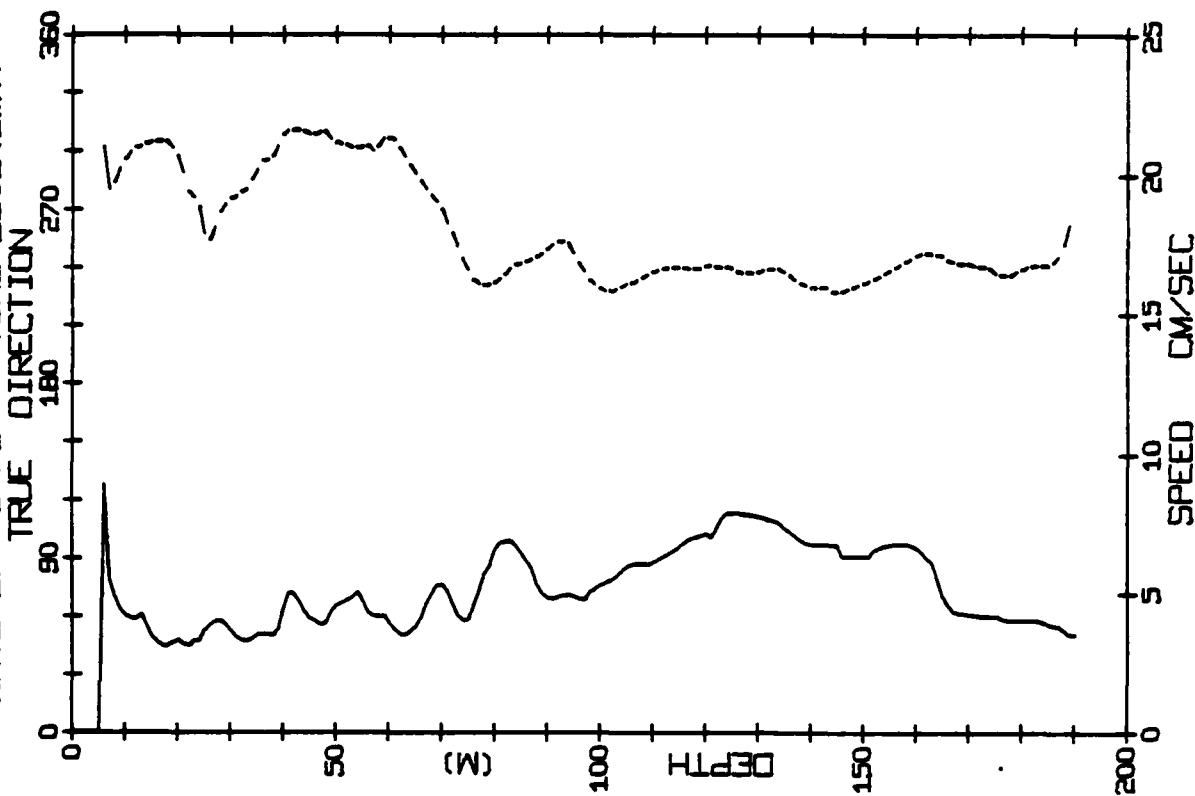




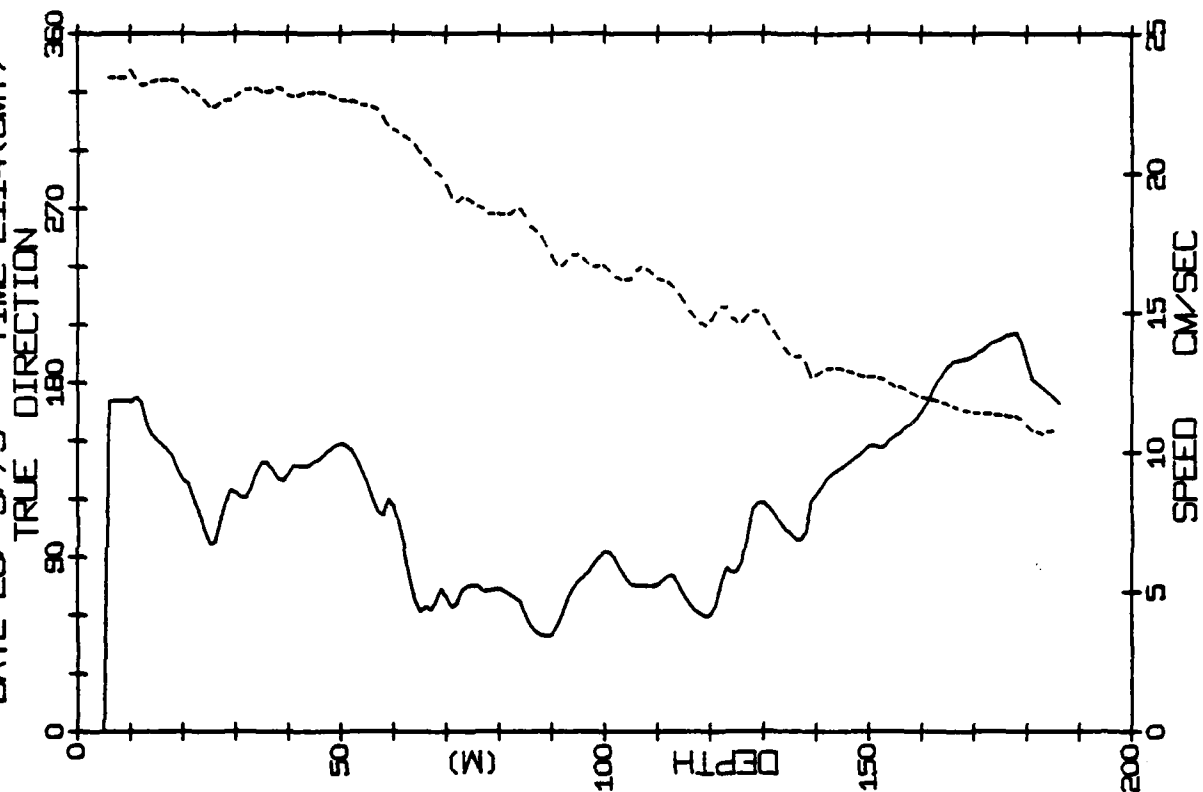
CAMP BLUE FOX STATION 39
DATE 27/ 5/75 TIME 538(GMT)



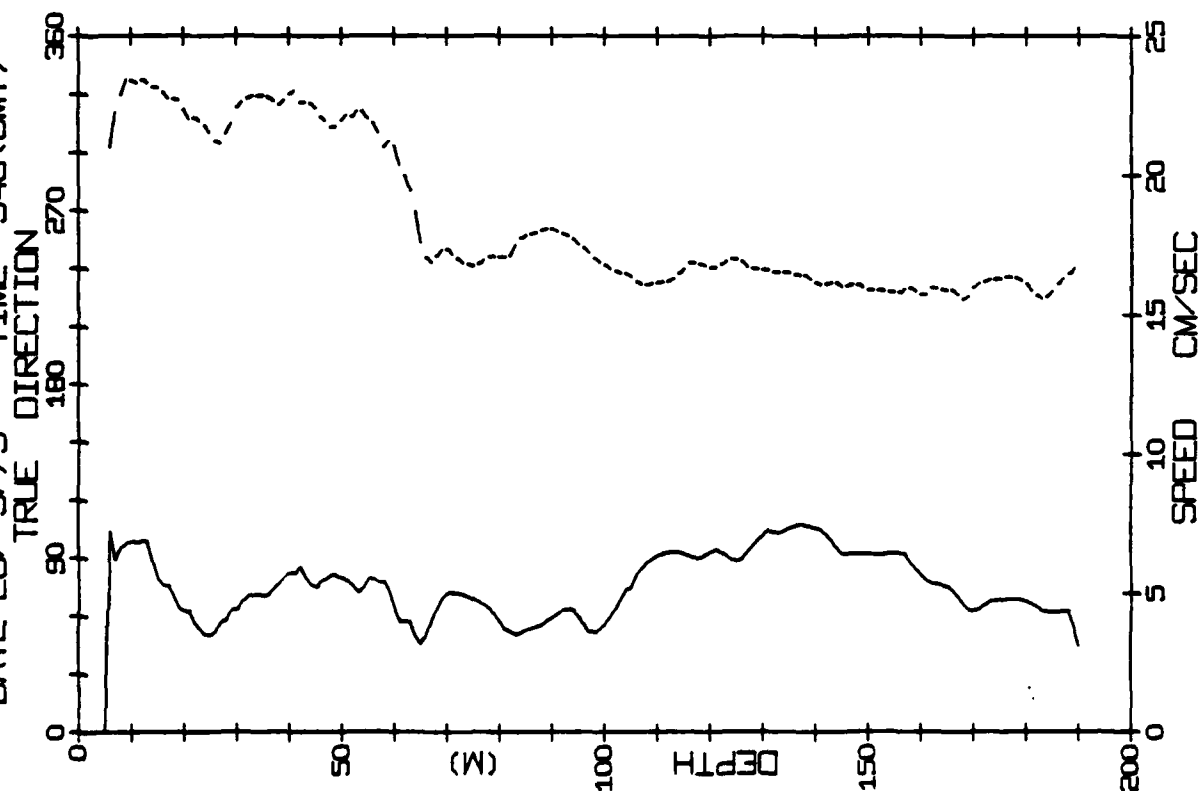
CAMP BLUE FOX STATION 40
DATE 27/ 5/75 TIME 2108(GMT)

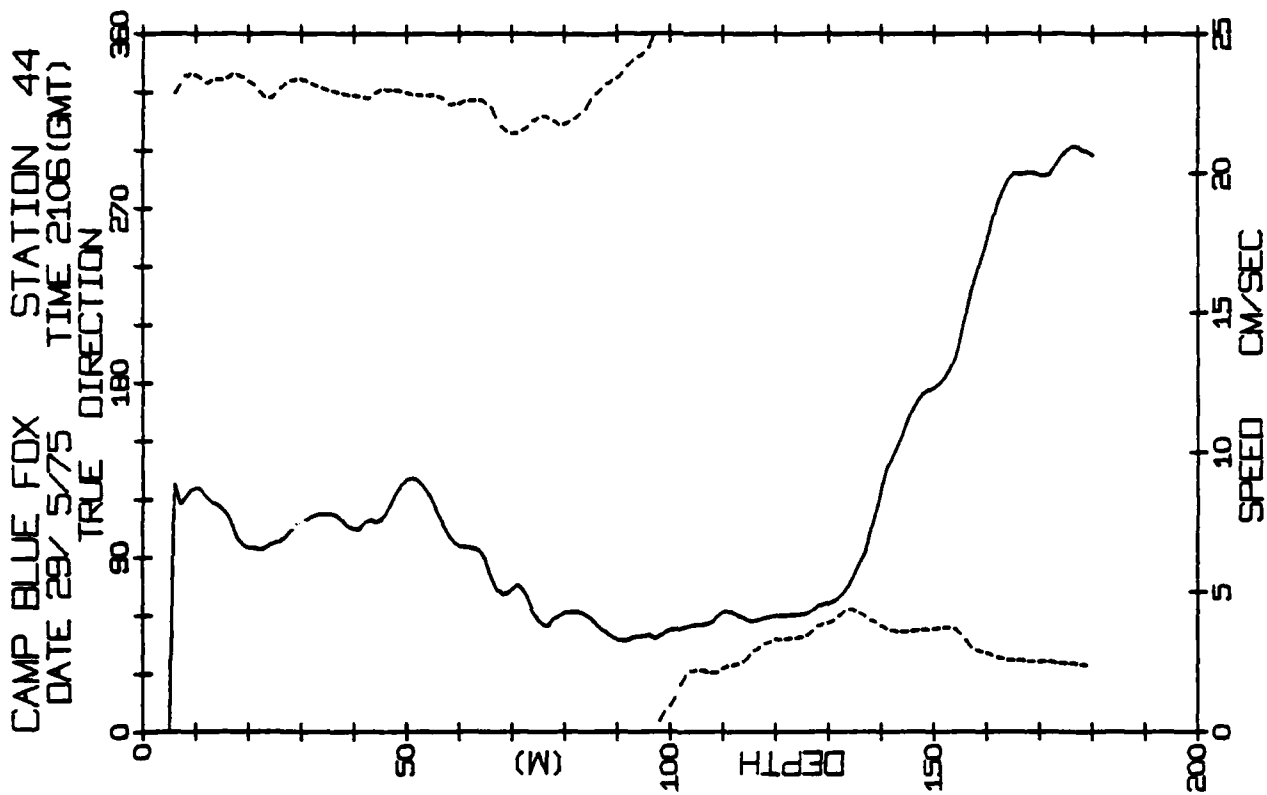
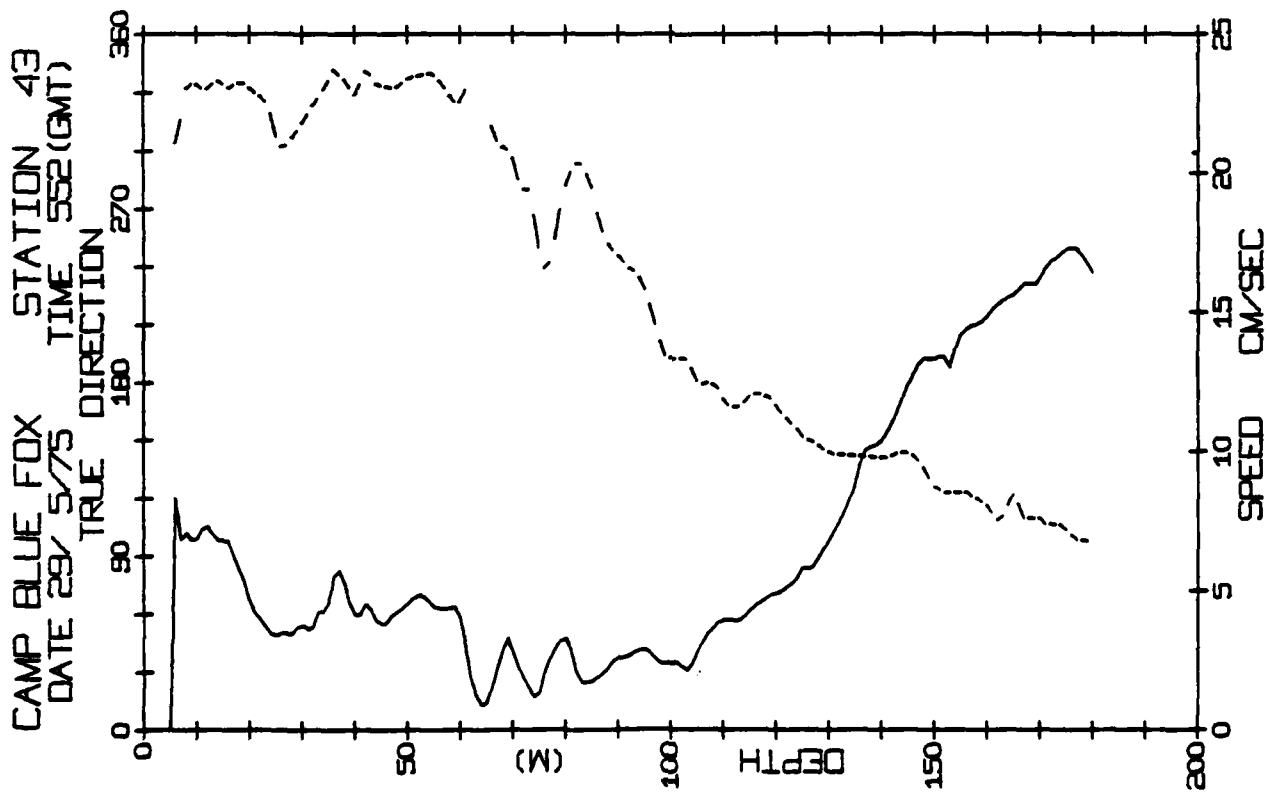


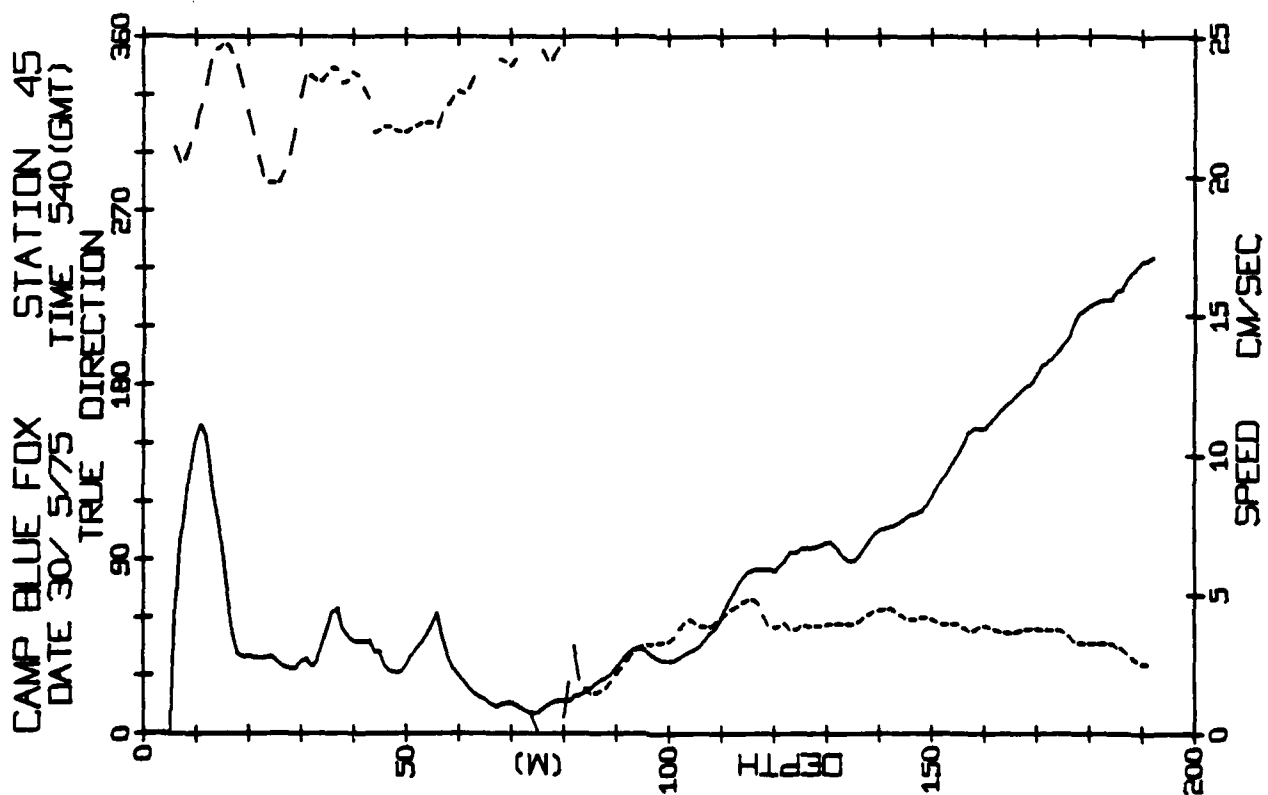
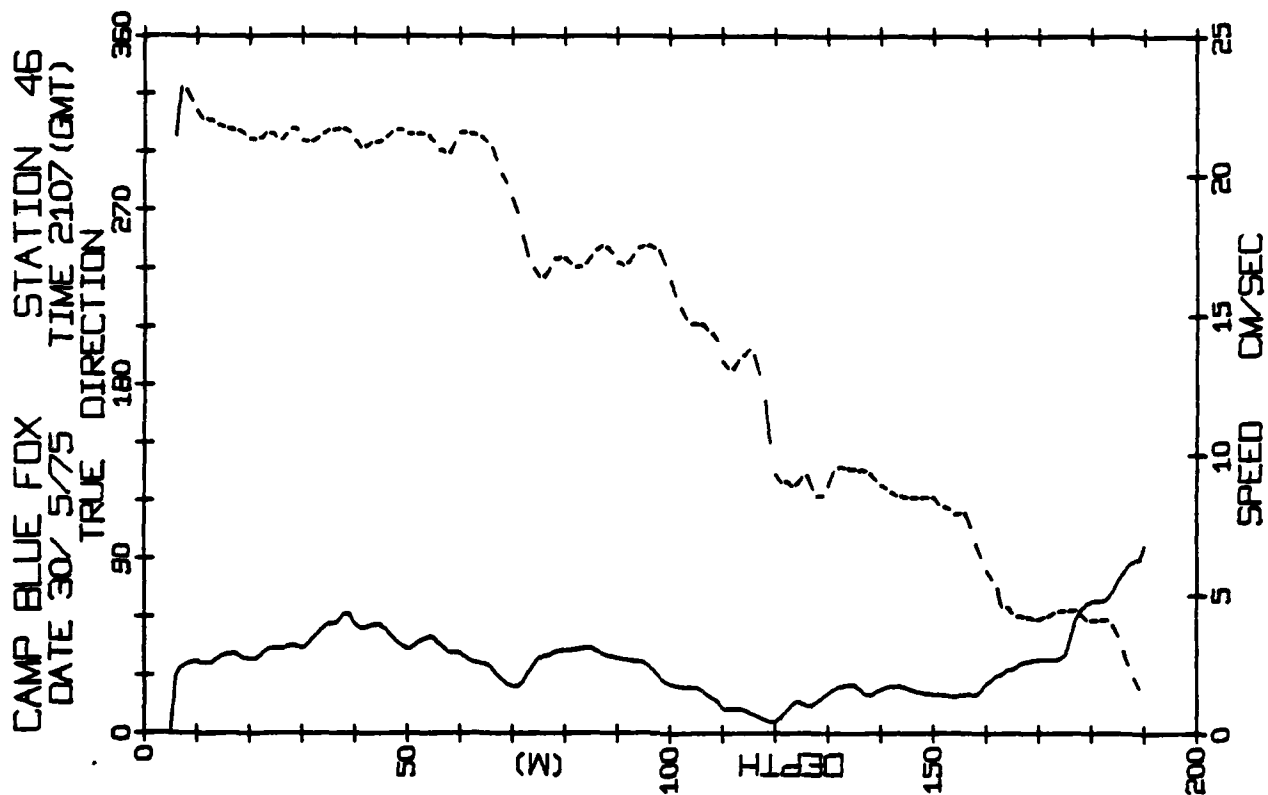
CAMP BLUE FOX STATION 42
 DATE 28/ 5/75 TIME 2114 (GMT)



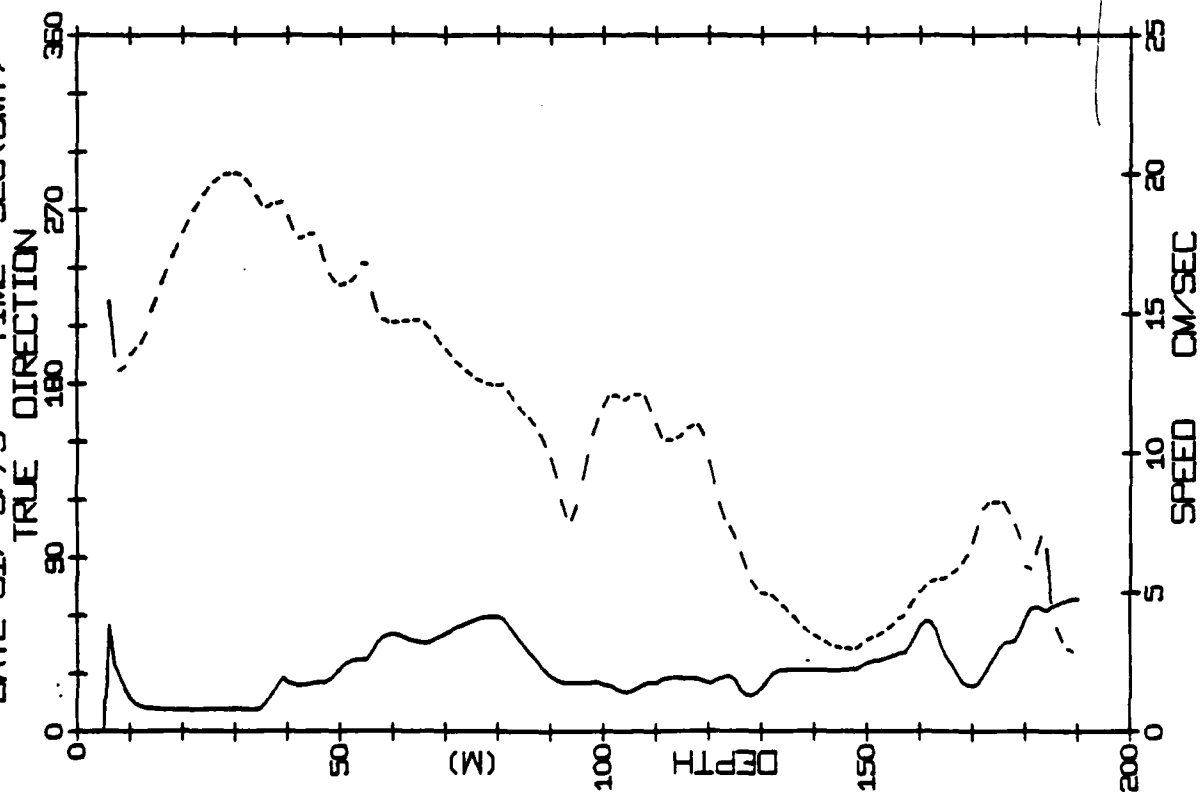
CAMP BLUE FOX STATION 41
 DATE 28/ 5/75 TIME 548 (GMT)



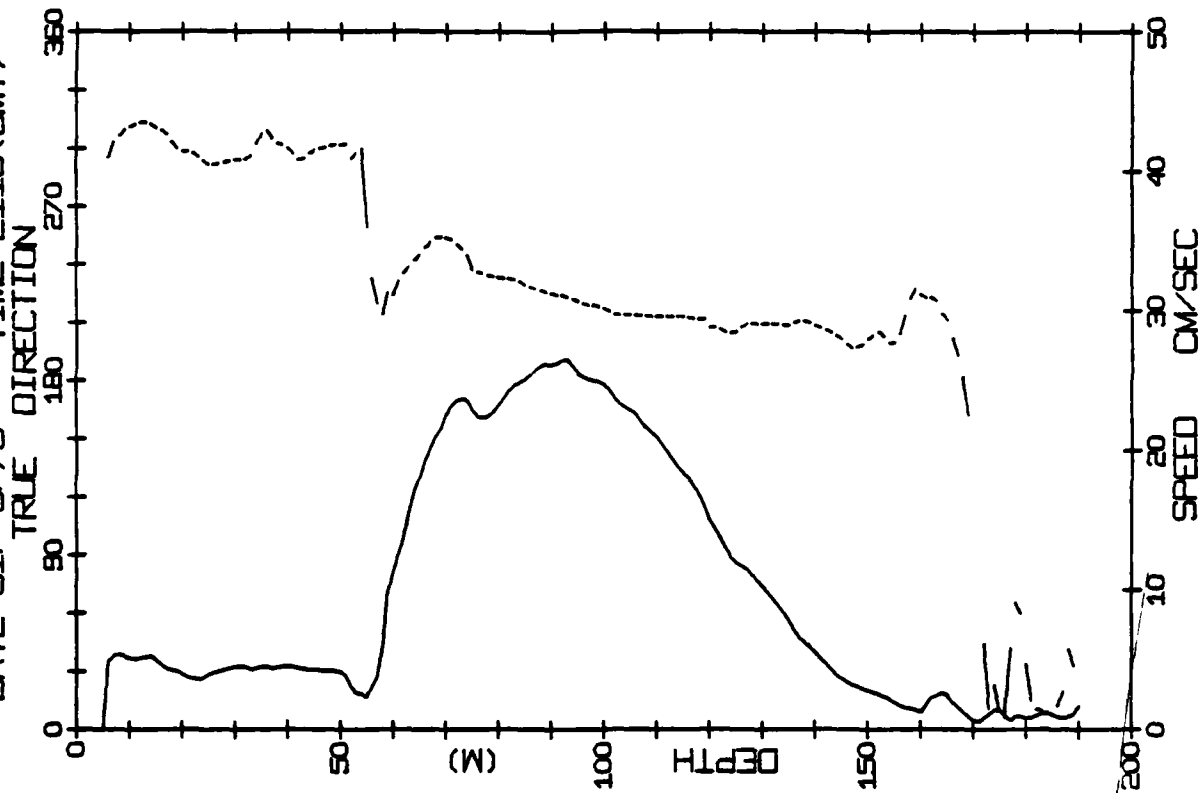


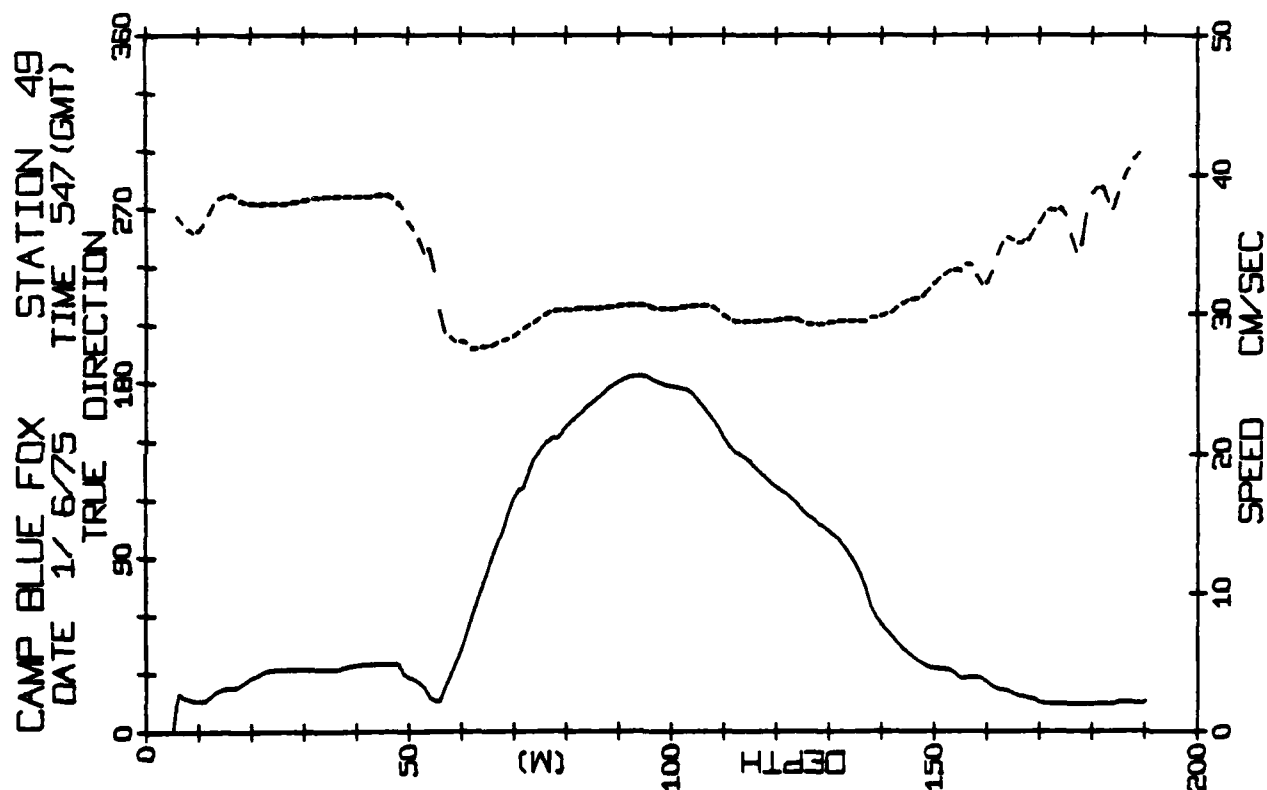
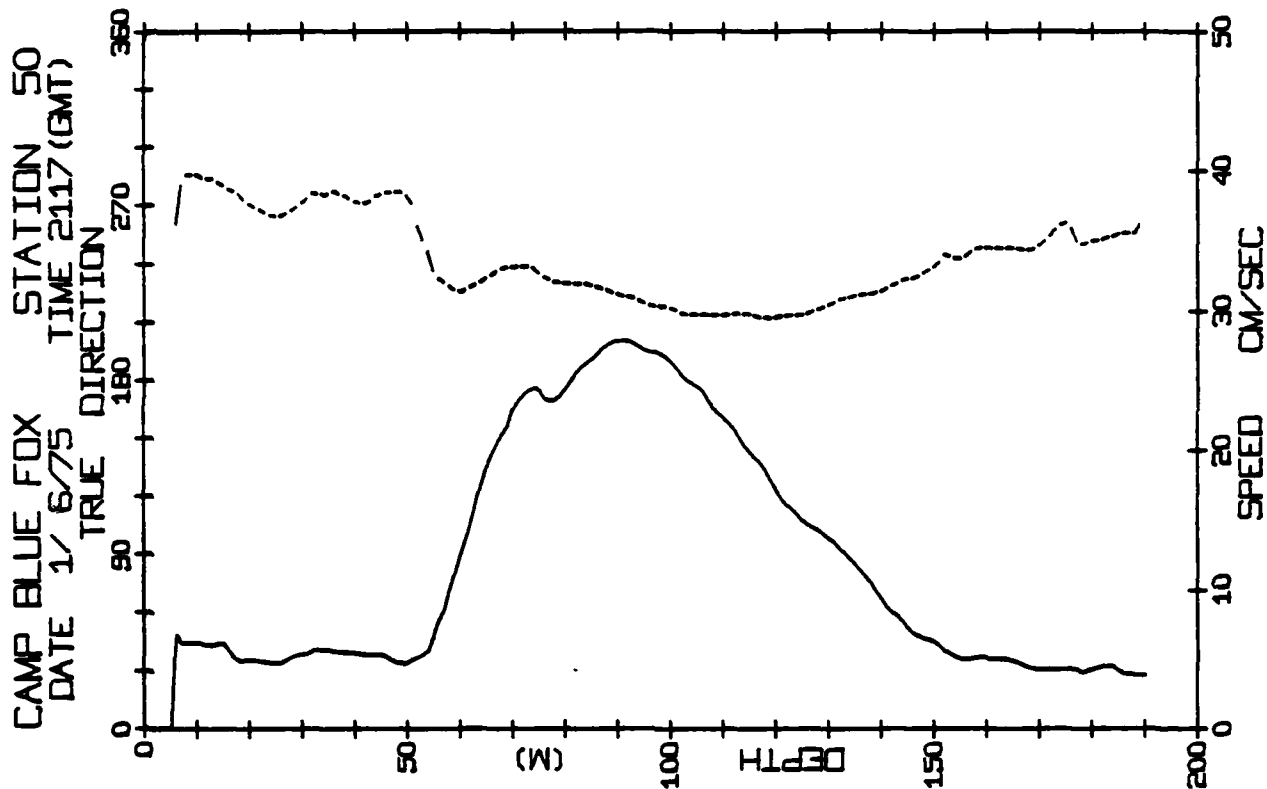


CAMP BLUE FOX STATION 47
DATE 31/ 5/75 TIME 528(GMT)

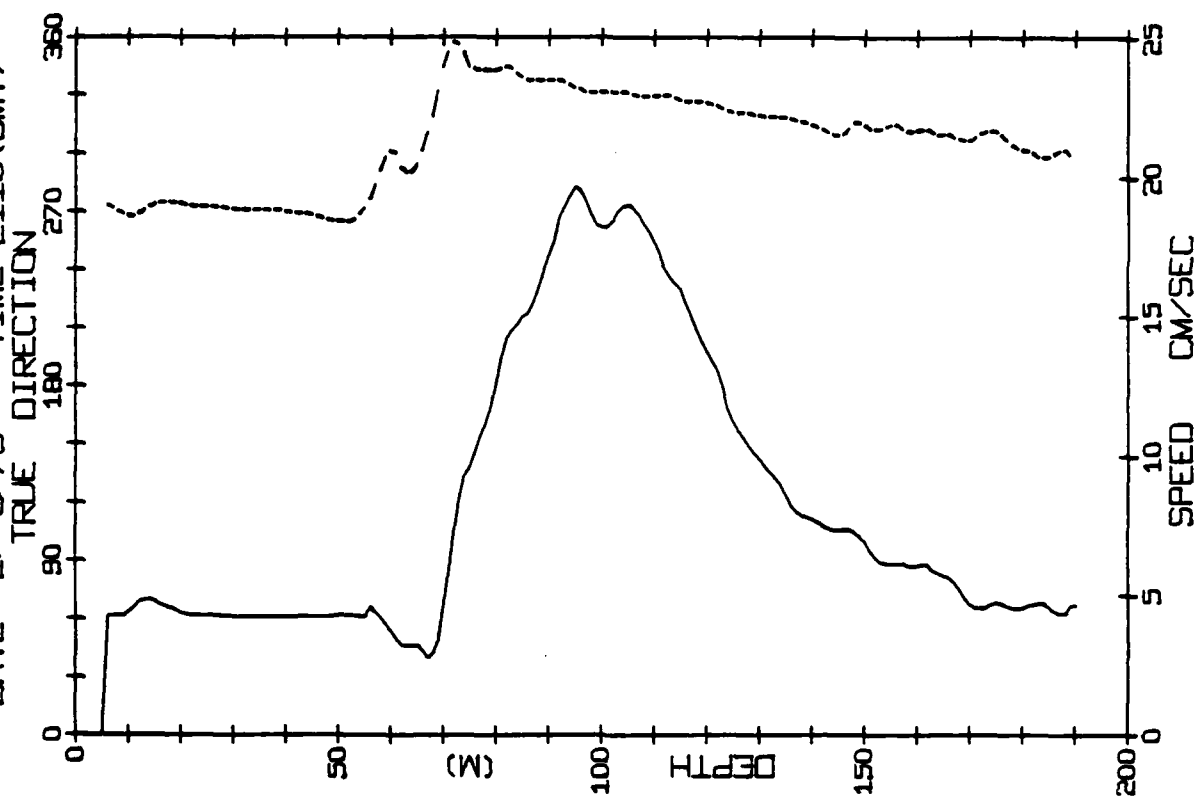


CAMP BLUE FOX STATION 48
DATE 31/ 5/75 TIME 2118(GMT)

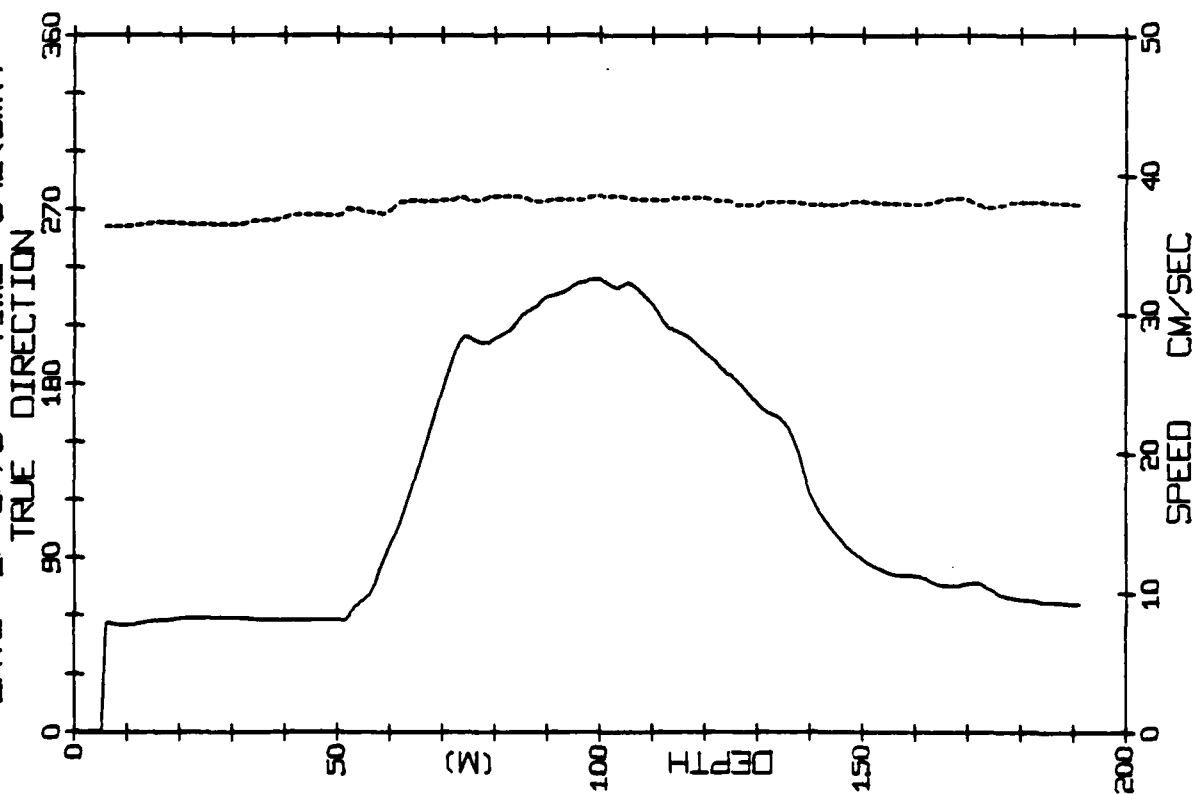




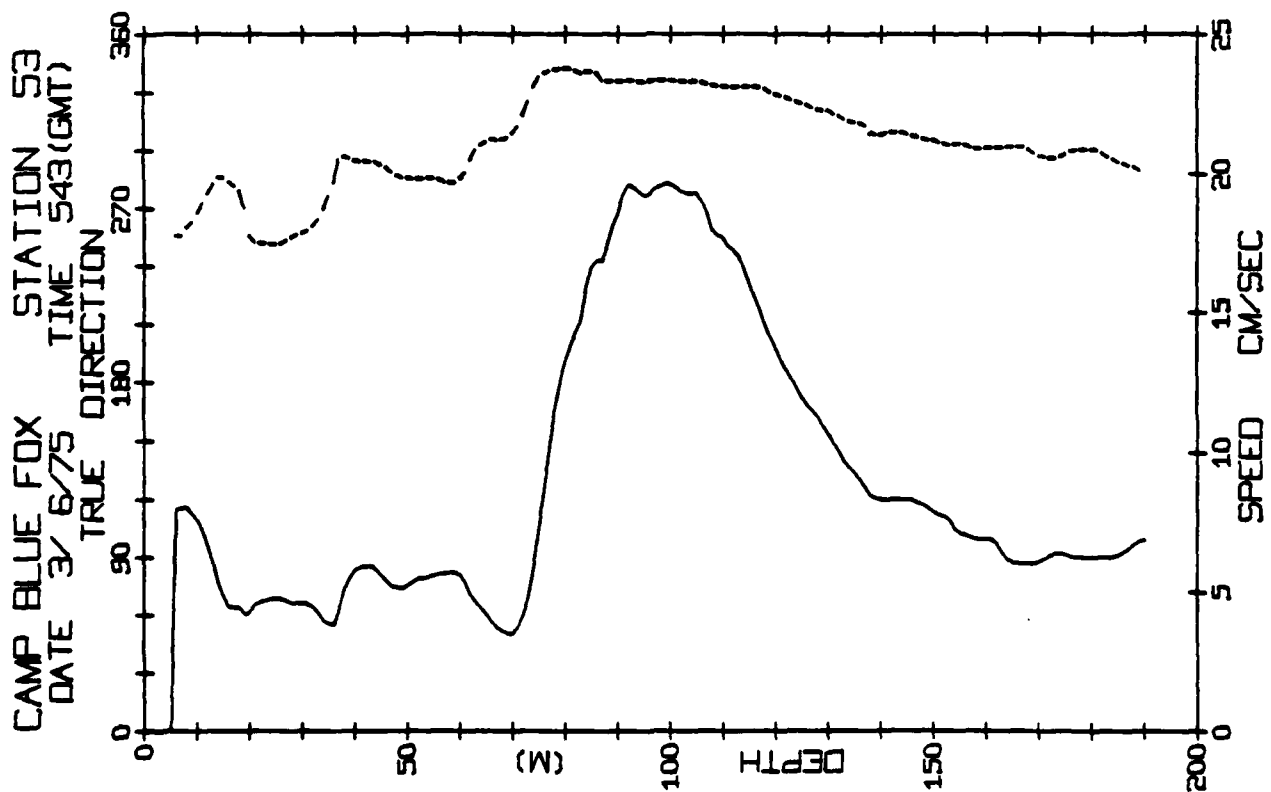
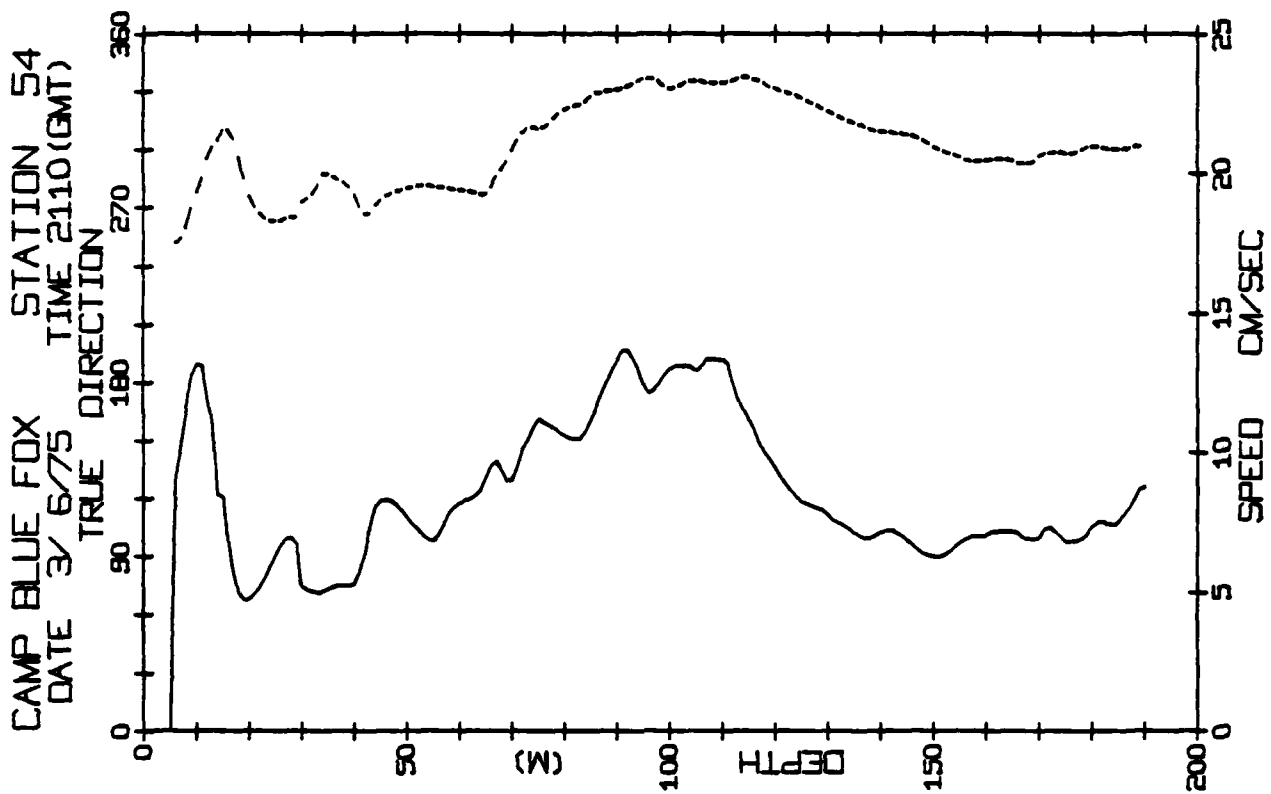
CAMP BLUE FOX STATION 52
DATE 2/ 6/75 TIME 2110 (GMT)



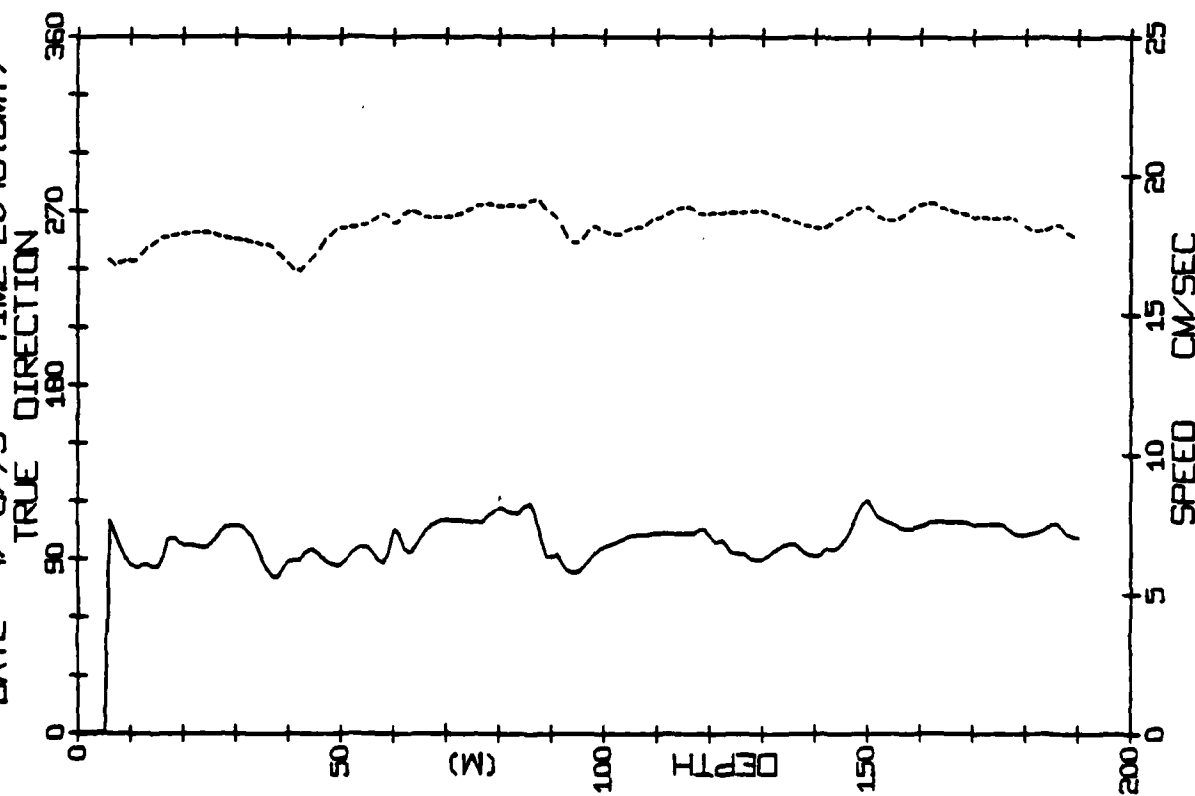
CAMP BLUE FOX STATION 51
DATE 2/ 6/75 TIME 542 (GMT)



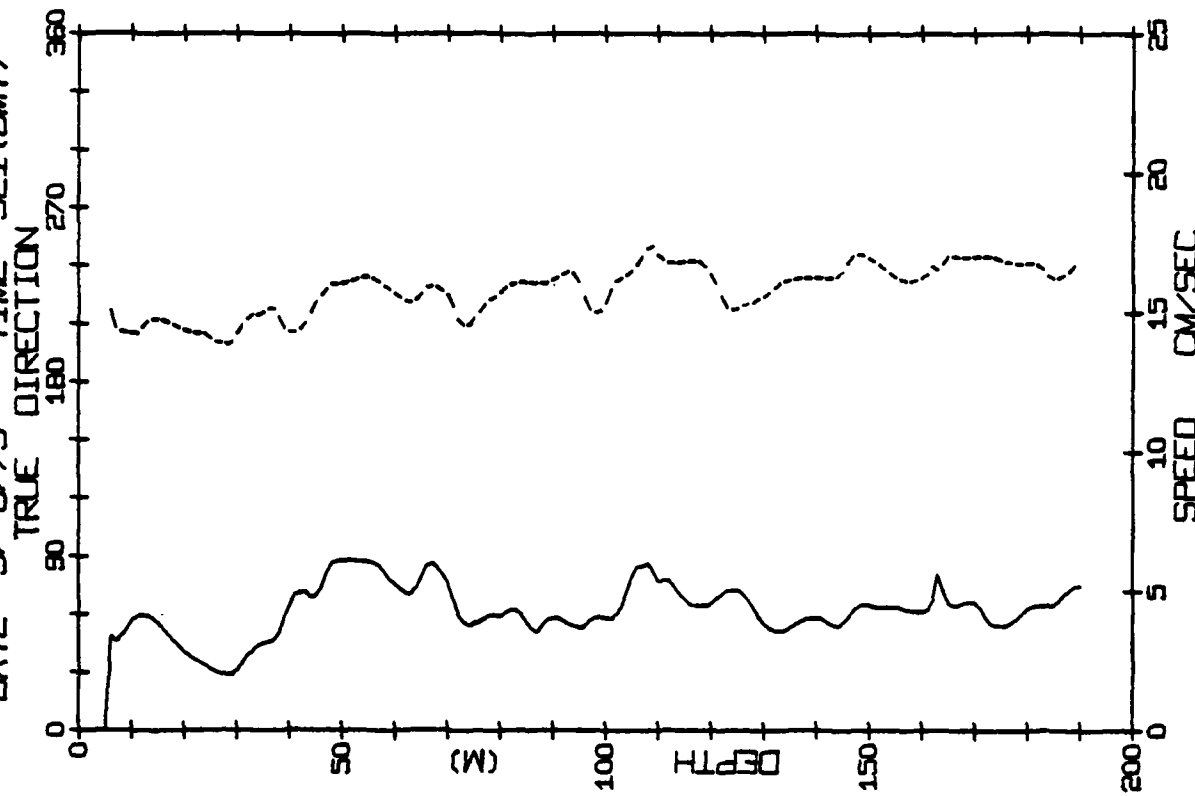
BLUE FOX STATION 51 (191M.) 2/JUN/75 542 GMT
 LAT= 77.1040N LONG= 145.2066W LTER= 0. LGER= 0.
 NIVEL= -0.6 EIVEL= -8.7 NVER= 0. EVER= 0.



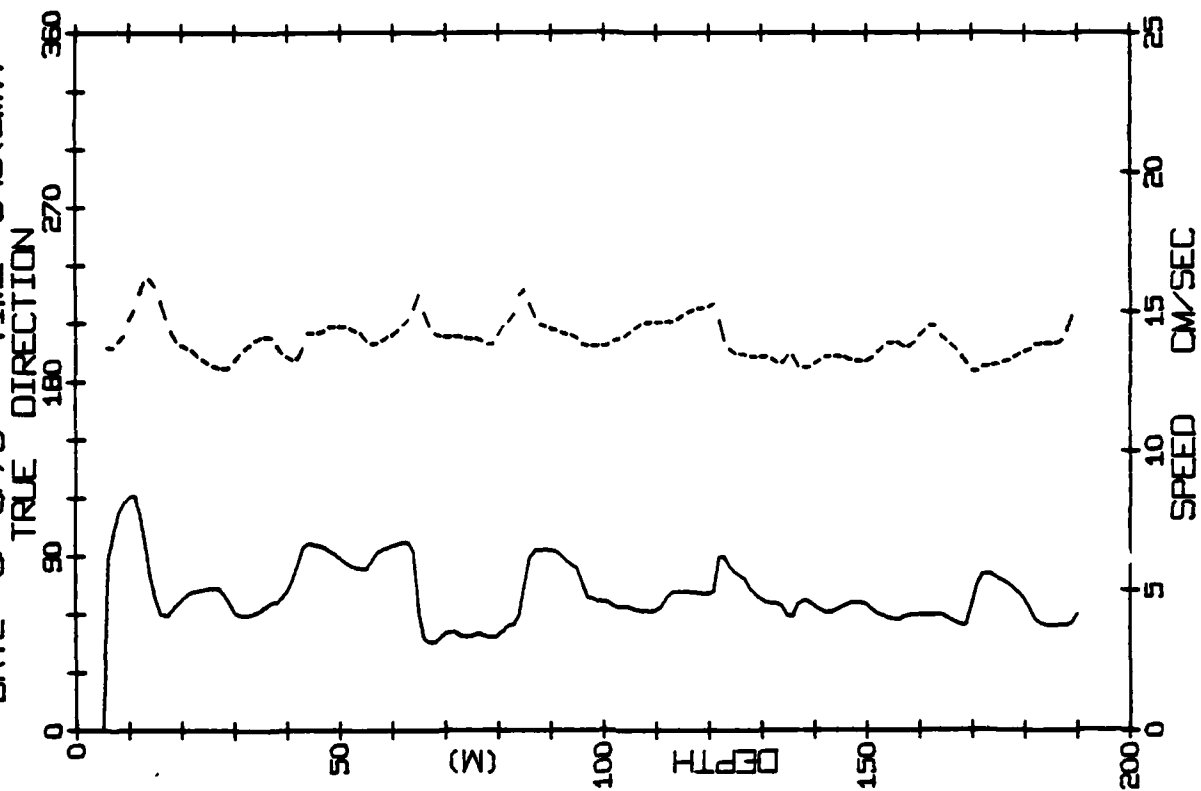
CAMP BLUE FOX STATION 56
 DATE 4/ 6/75 TIME 2048(GMT)



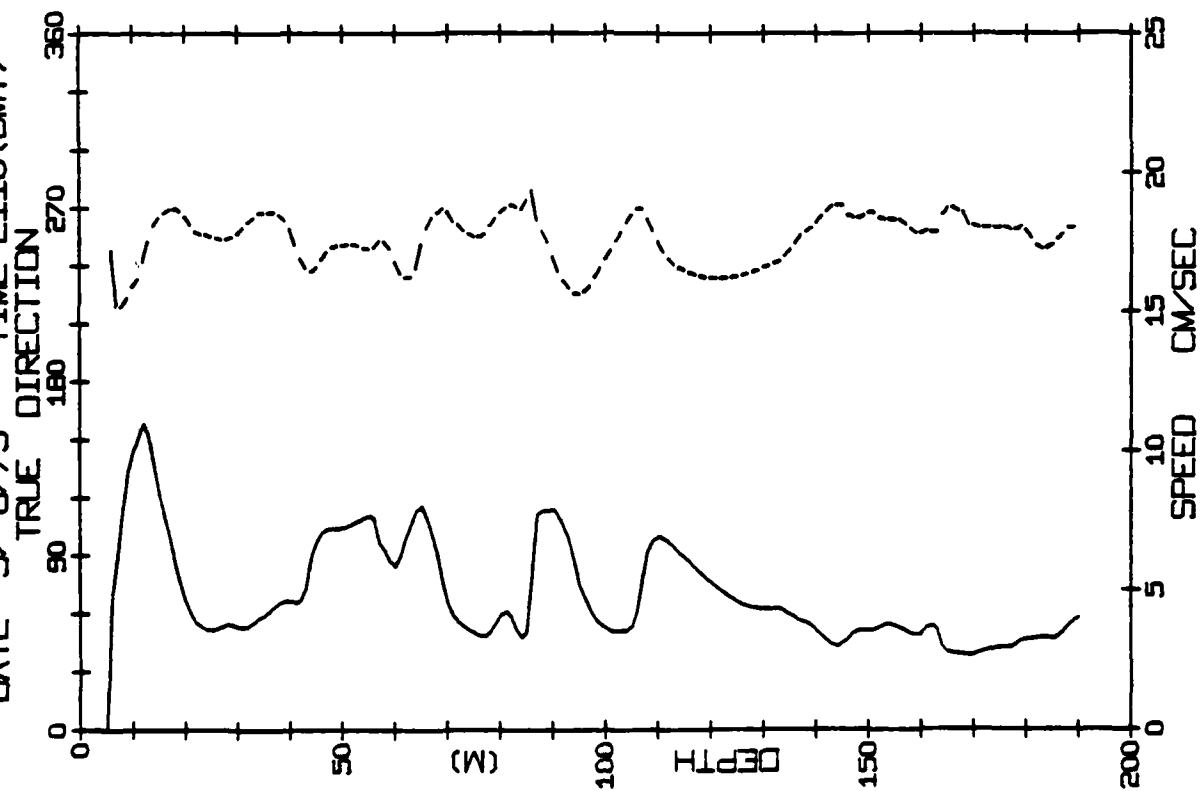
CAMP BLUE FOX STATION 57
 DATE 5/ 6/75 TIME 521(GMT)



CAMP BLUE FOX STATION 59
DATE 6/ 6/75 TIME 546(GMT)

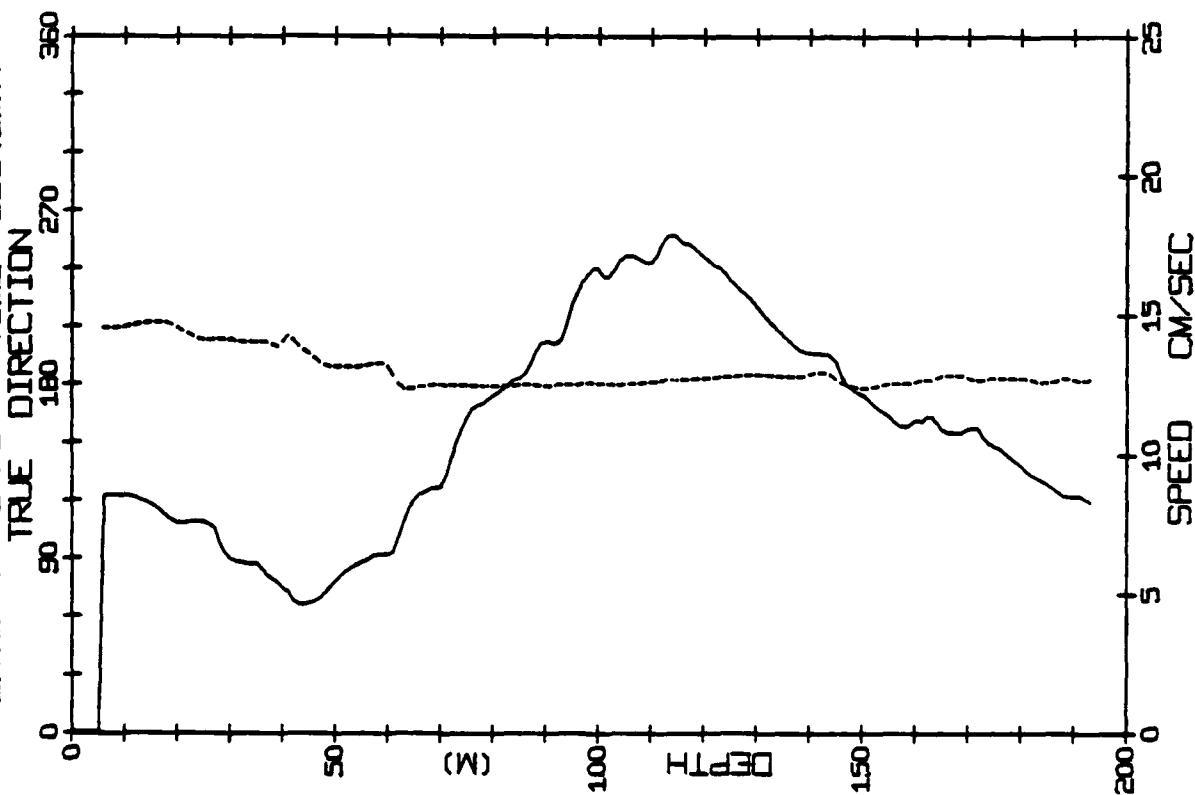


CAMP BLUE FOX STATION 58
DATE 5/ 6/75 TIME 2110(GMT)



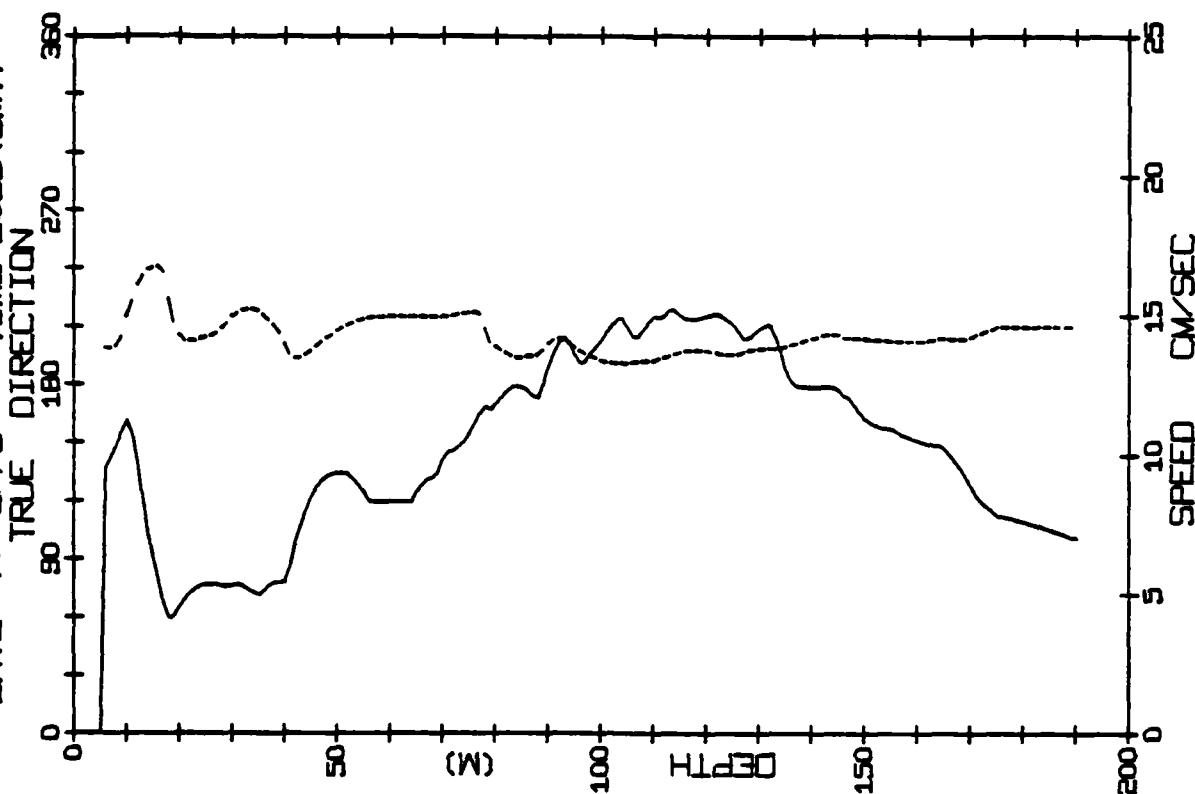
CAMP BLUE FOX
DATE 7/6/75

STATION 61
TIME 553(GMT)

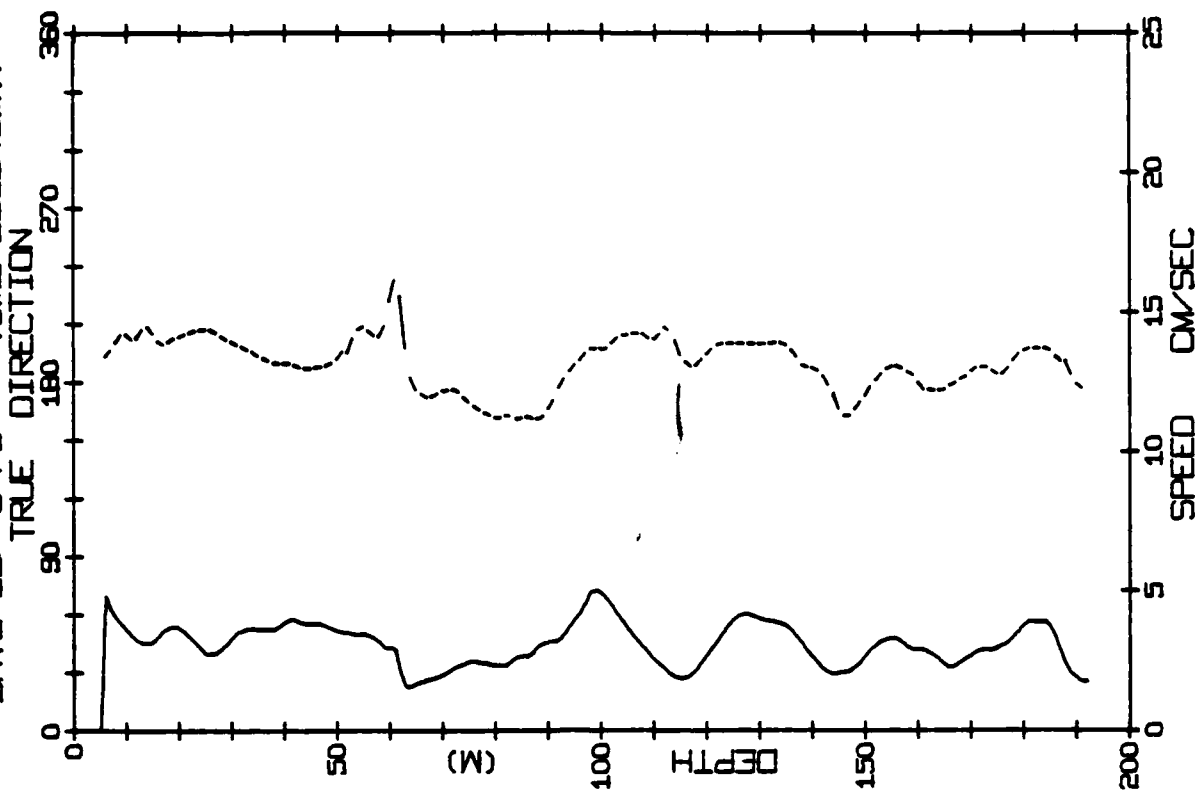


CAMP BLUE FOX
DATE 7/6/75

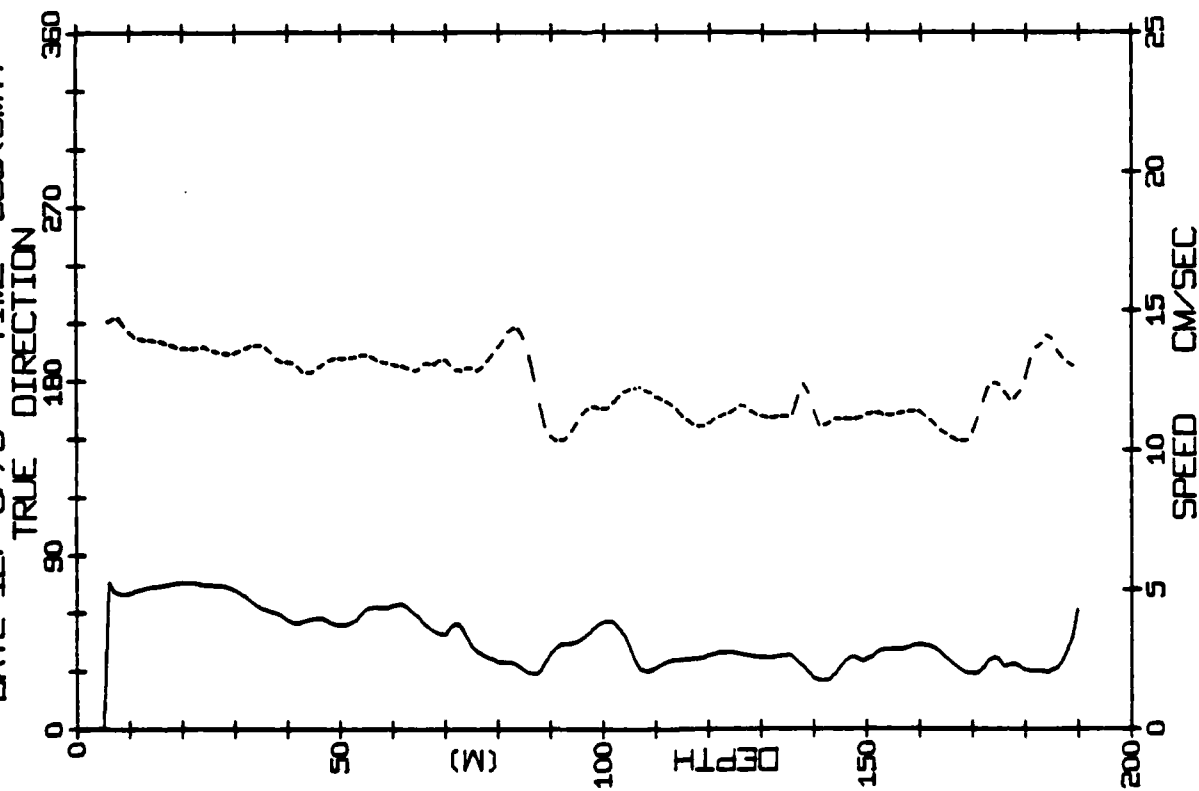
STATION 62
TIME 2055(GMT)



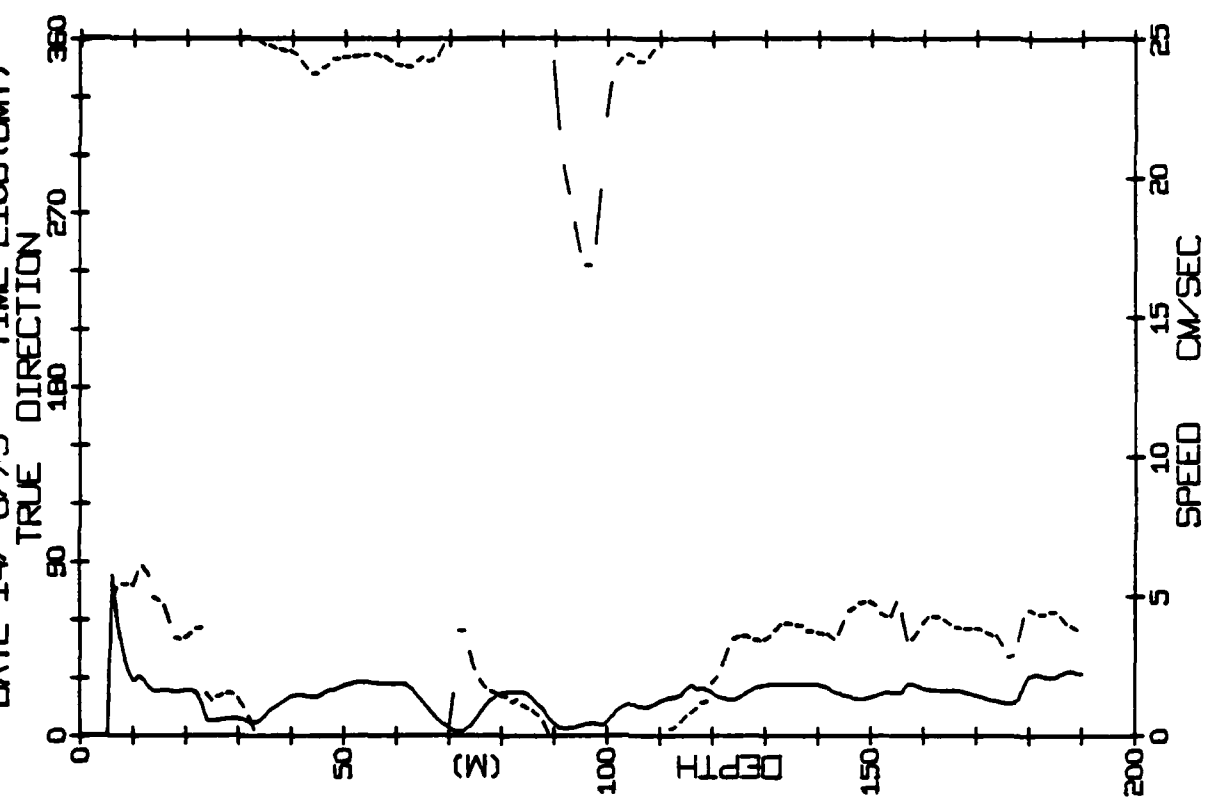
CAMP BLUE FOX STATION 71
DATE 12/ 6/75 TIME 2131 (GMT)



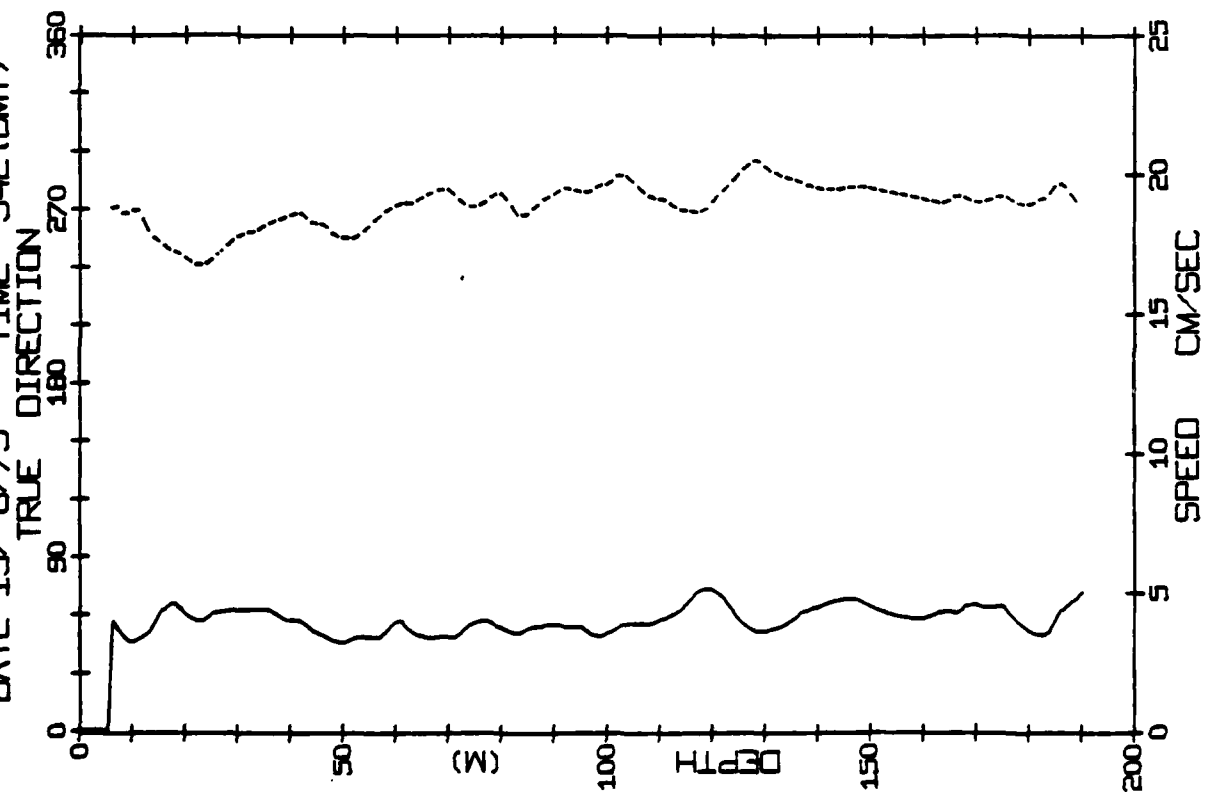
CAMP BLUE FOX STATION 70
DATE 12/ 6/75 TIME 559 (GMT)



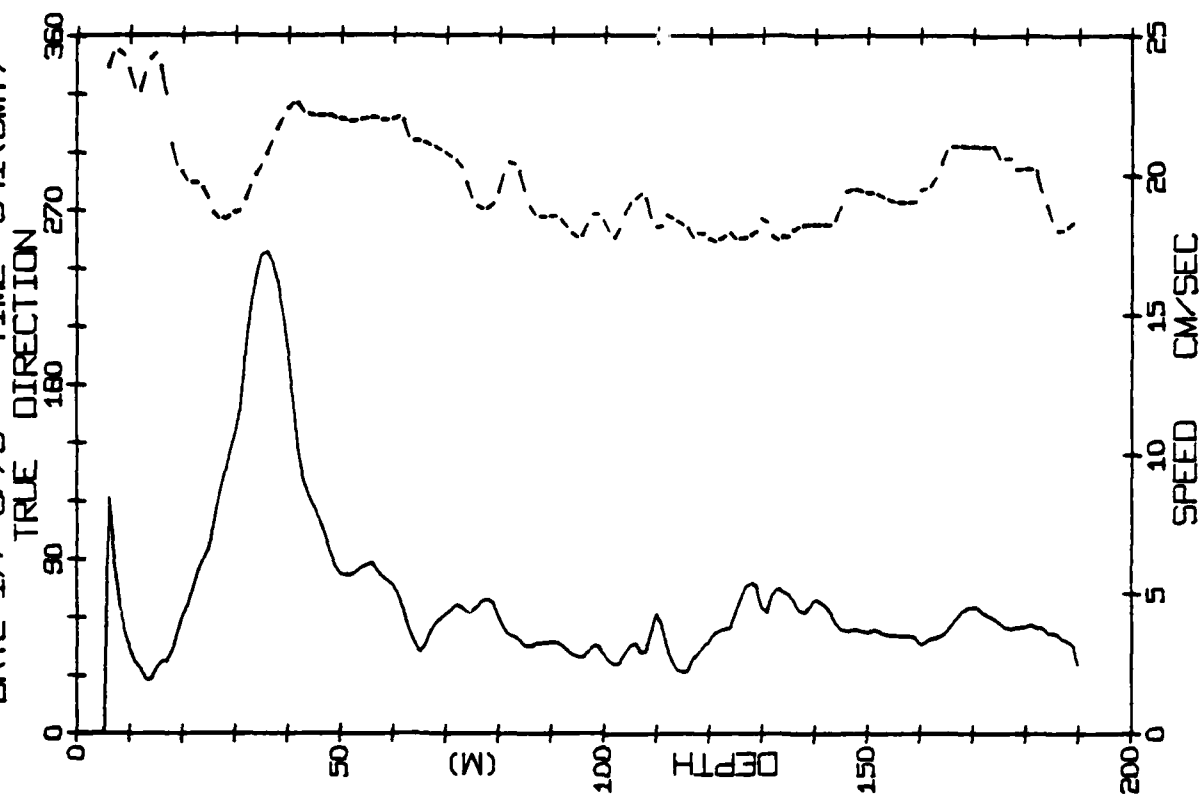
CAMP BLUE FOX STATION 75
 DATE 14/ 6/75 TIME 2108(GMT)



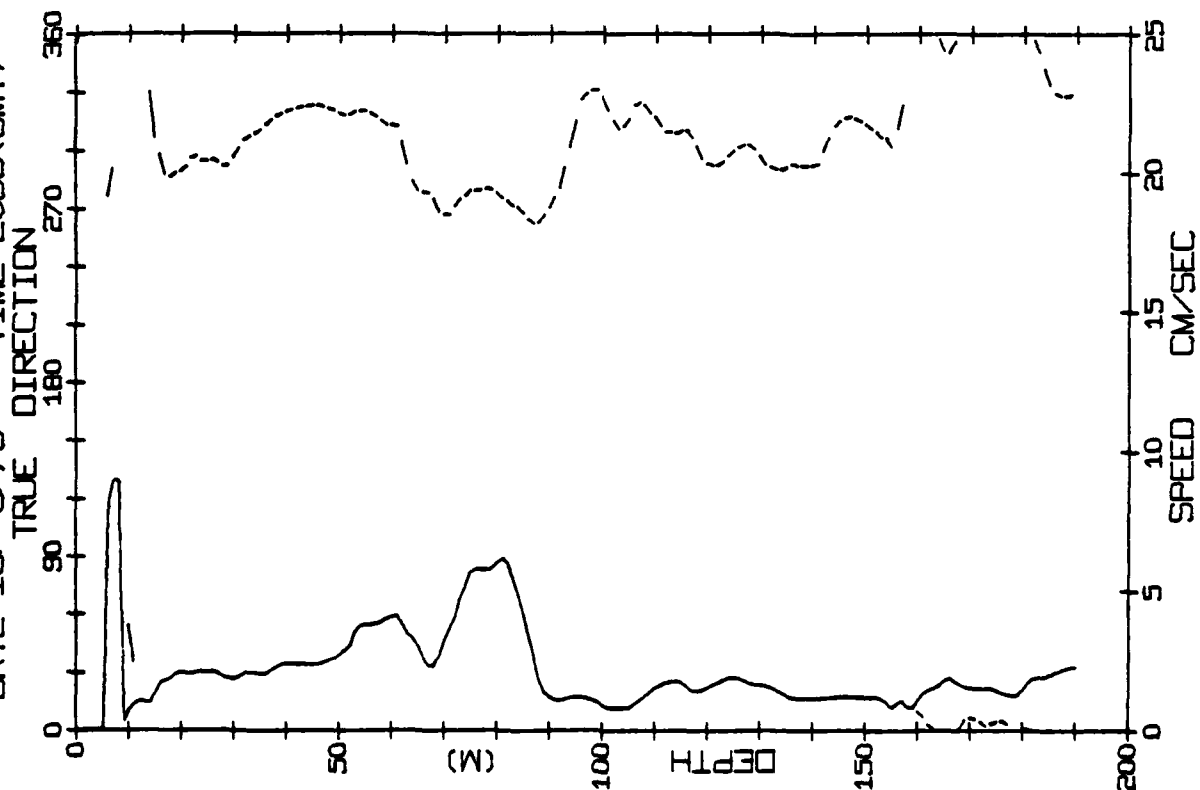
CAMP BLUE FOX STATION 72
 DATE 13/ 6/75 TIME 542(GMT)



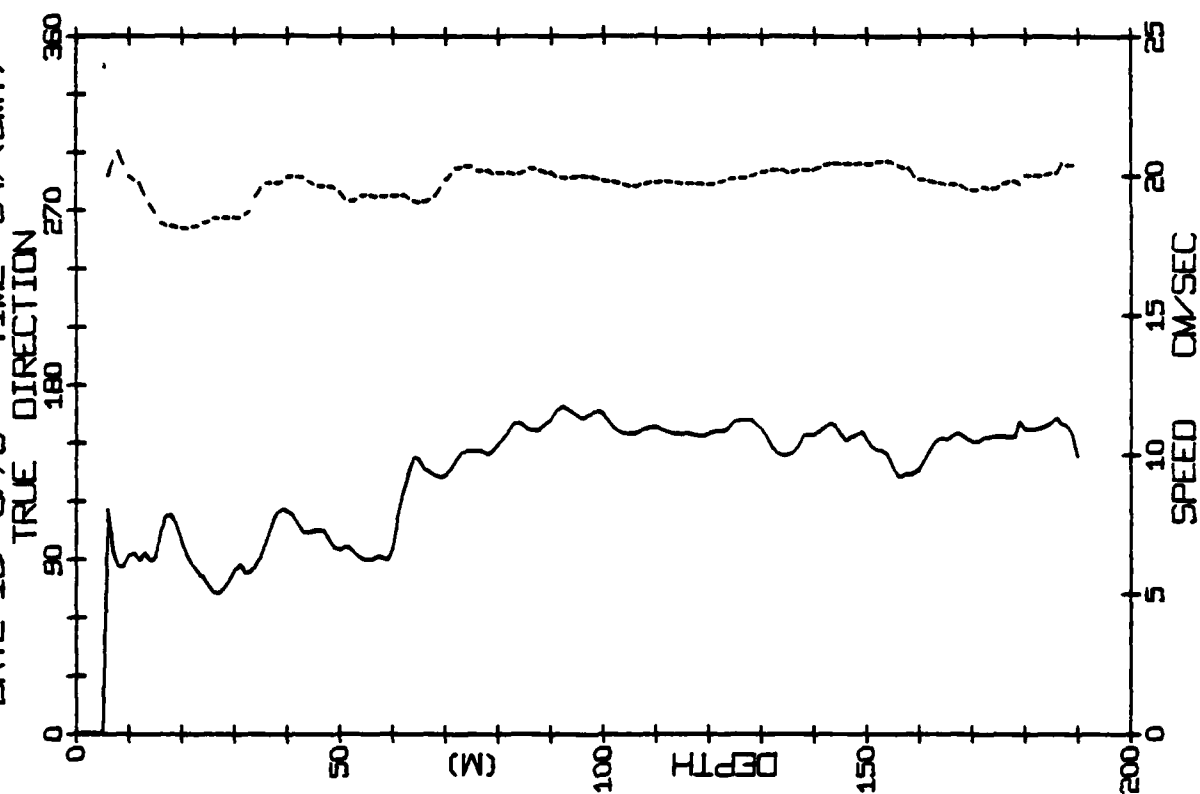
CAMP BLUE FOX STATION 80
DATE 17/ 6/75 TIME 541 (GMT)



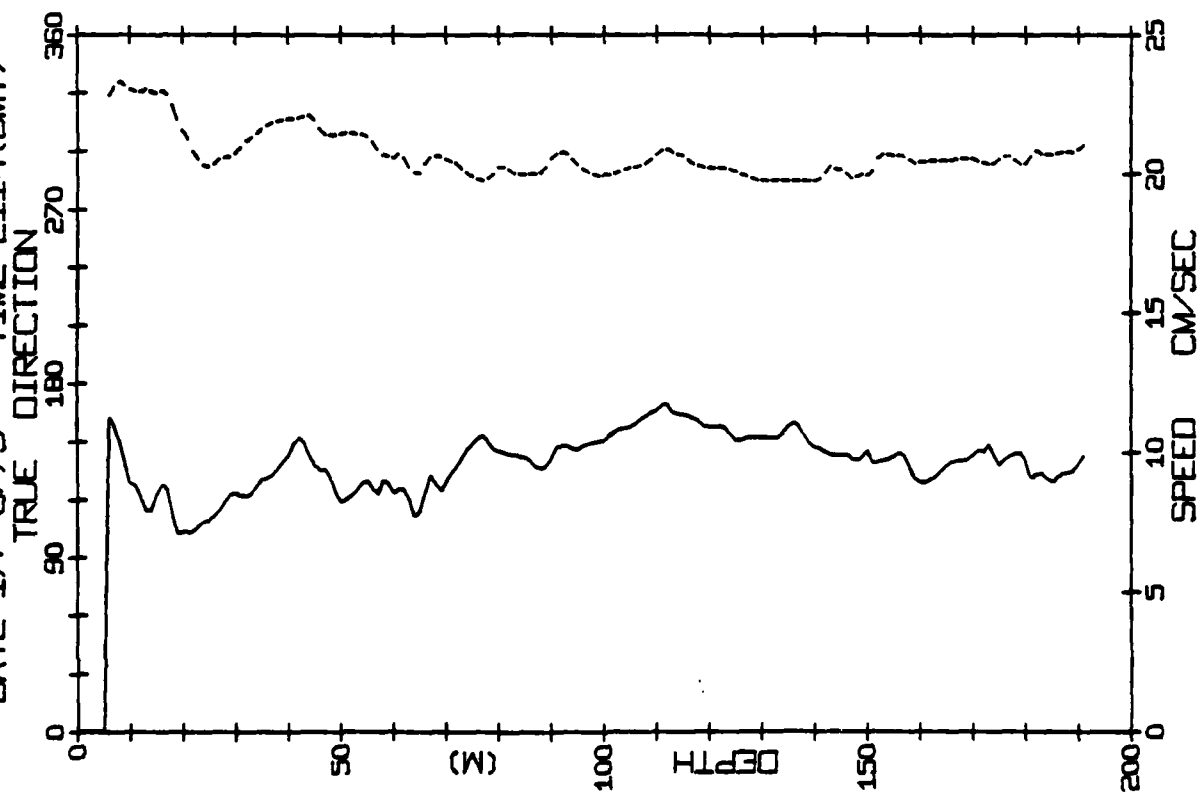
CAMP BLUE FOX STATION 79
DATE 16/ 6/75 TIME 2058 (GMT)



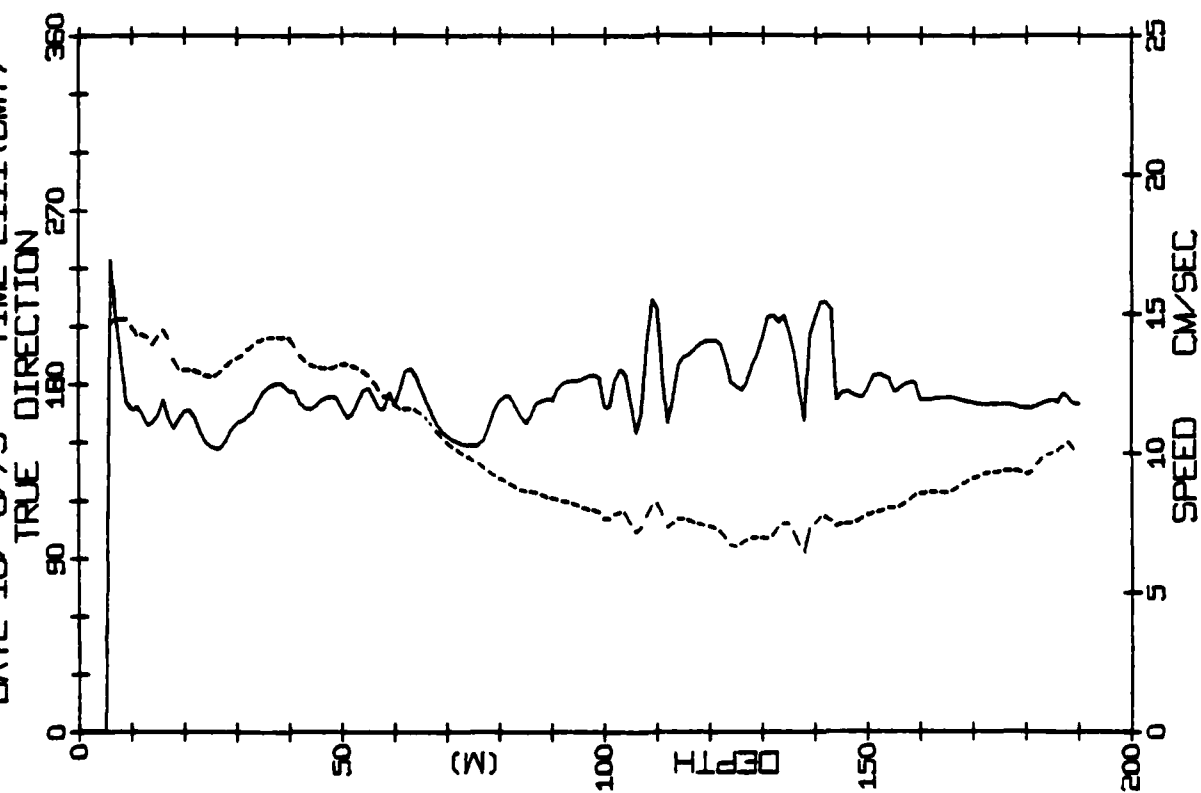
CAMP BLUE FOX STATION 82
DATE 18/ 6/75 TIME 547 (GMT)



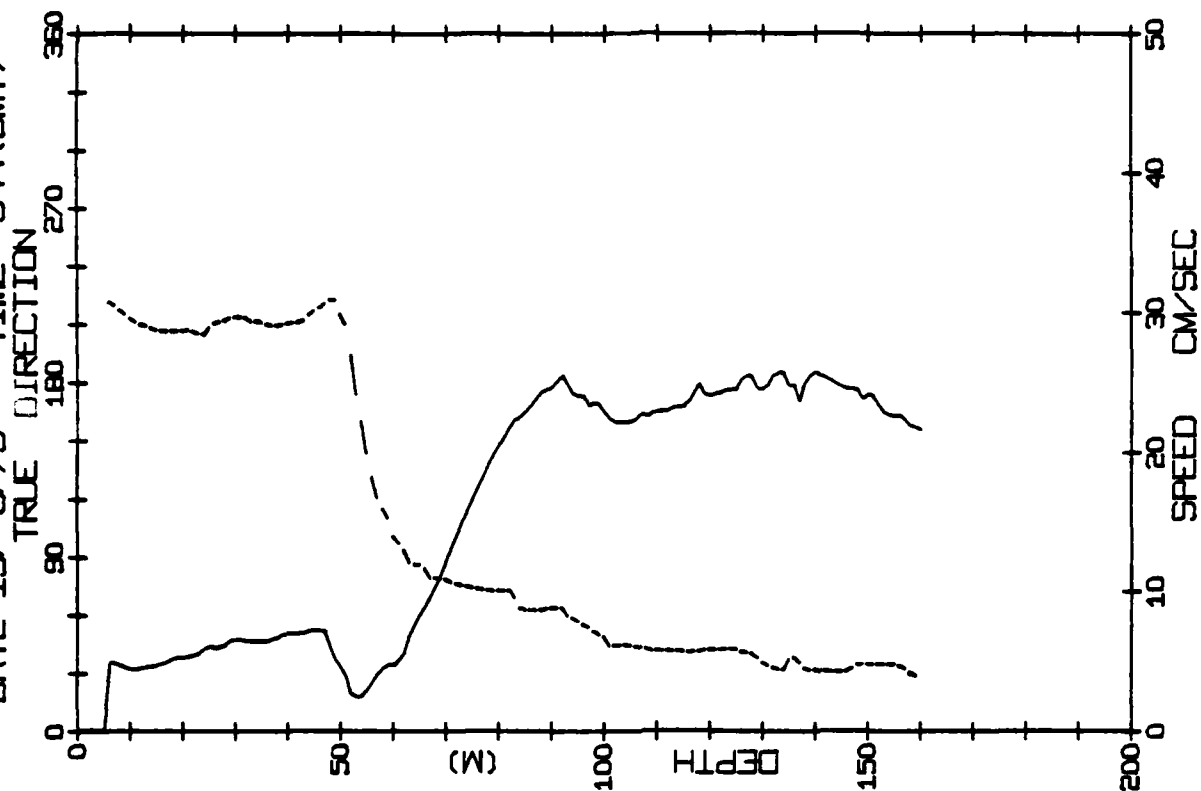
CAMP BLUE FOX STATION 81
DATE 17/ 6/75 TIME 2114 (GMT)



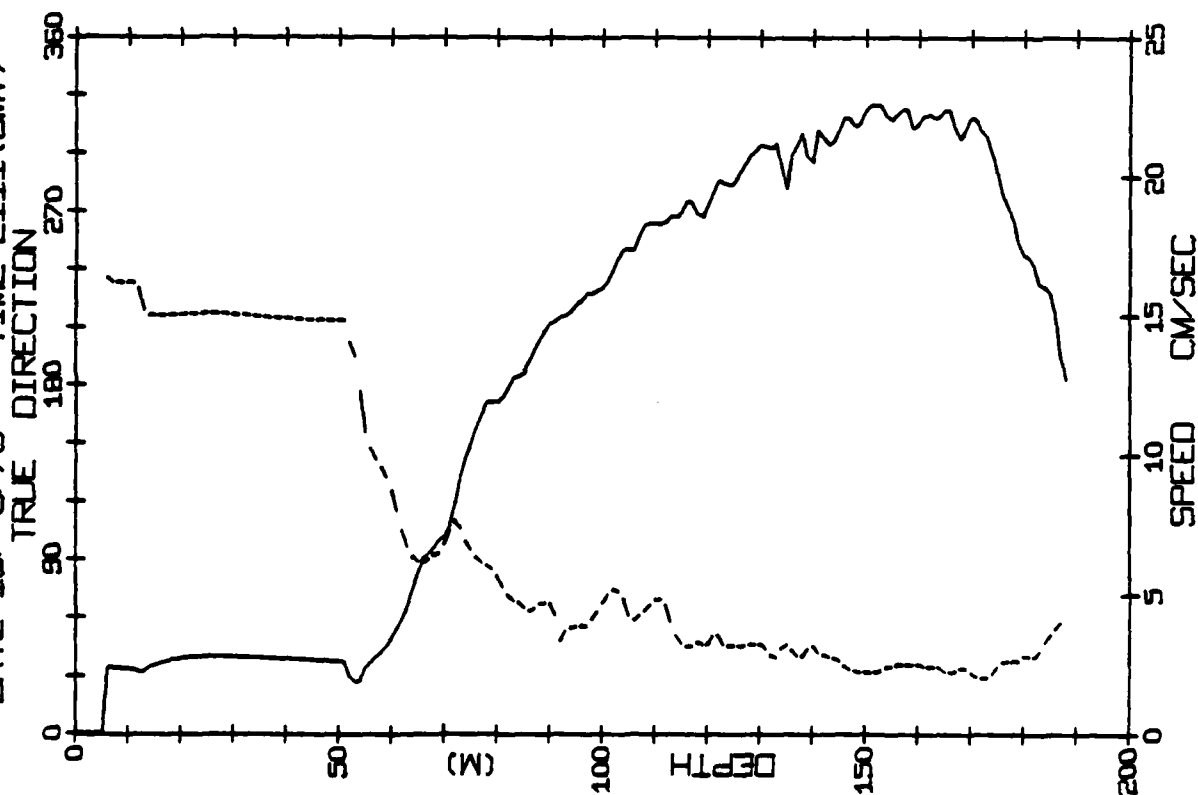
CAMP BLUE FOX STATION 83
DATE 18/ 6/75 TIME 2111 (GMT)



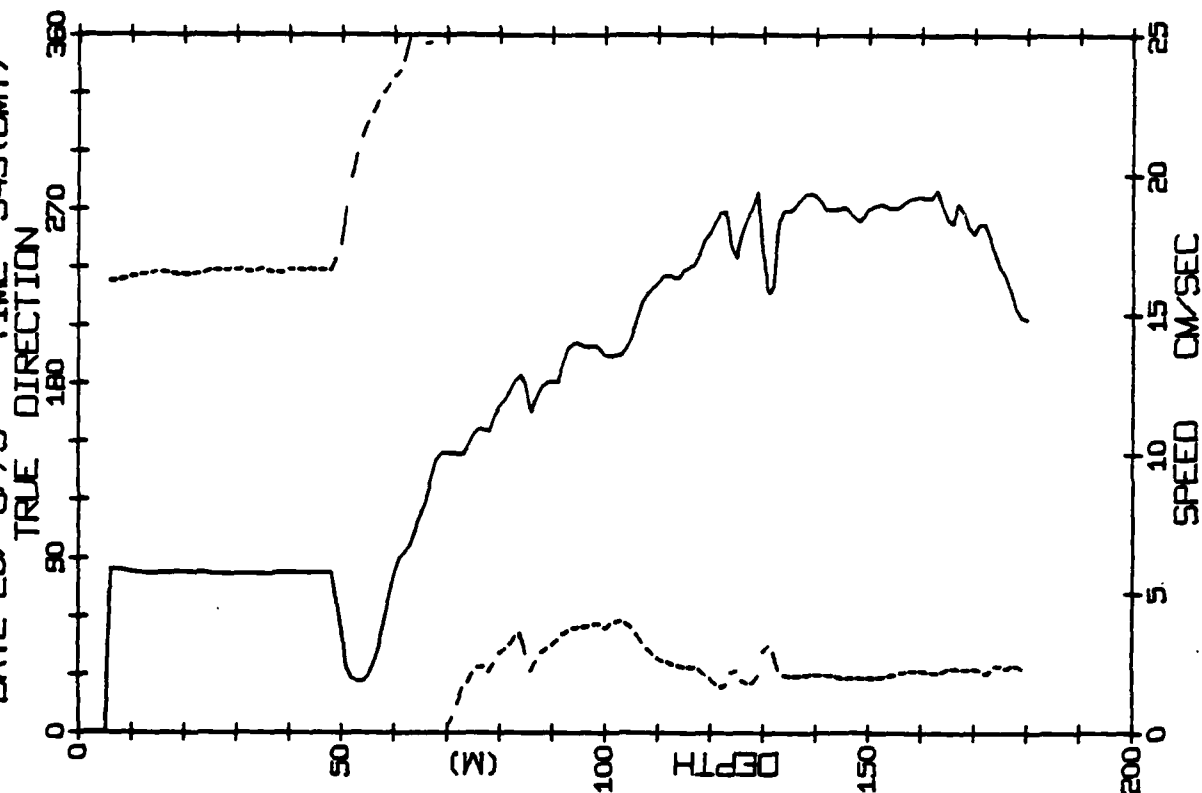
CAMP BLUE FOX STATION 84
DATE 19/ 6/75 TIME 544 (GMT)



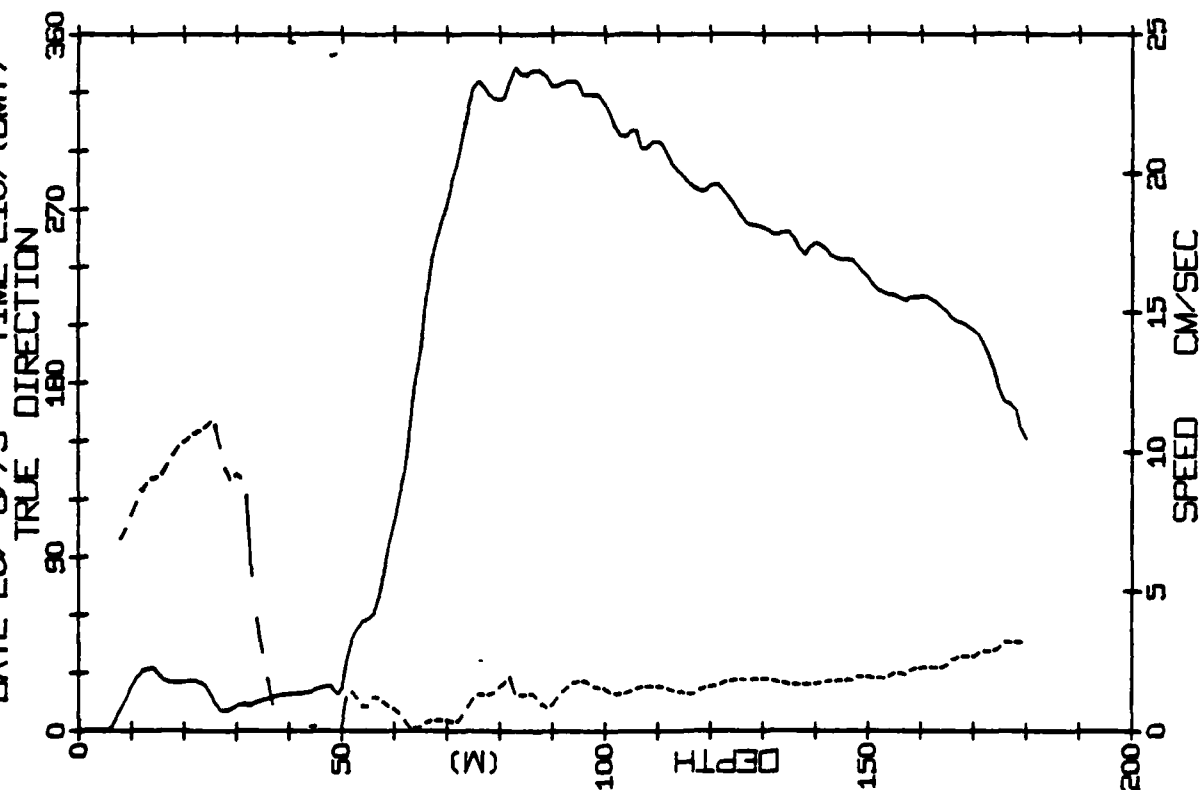
CAMP BLUE FOX STATION 85
DATE 19/ 6/75 TIME 2111(GMT)



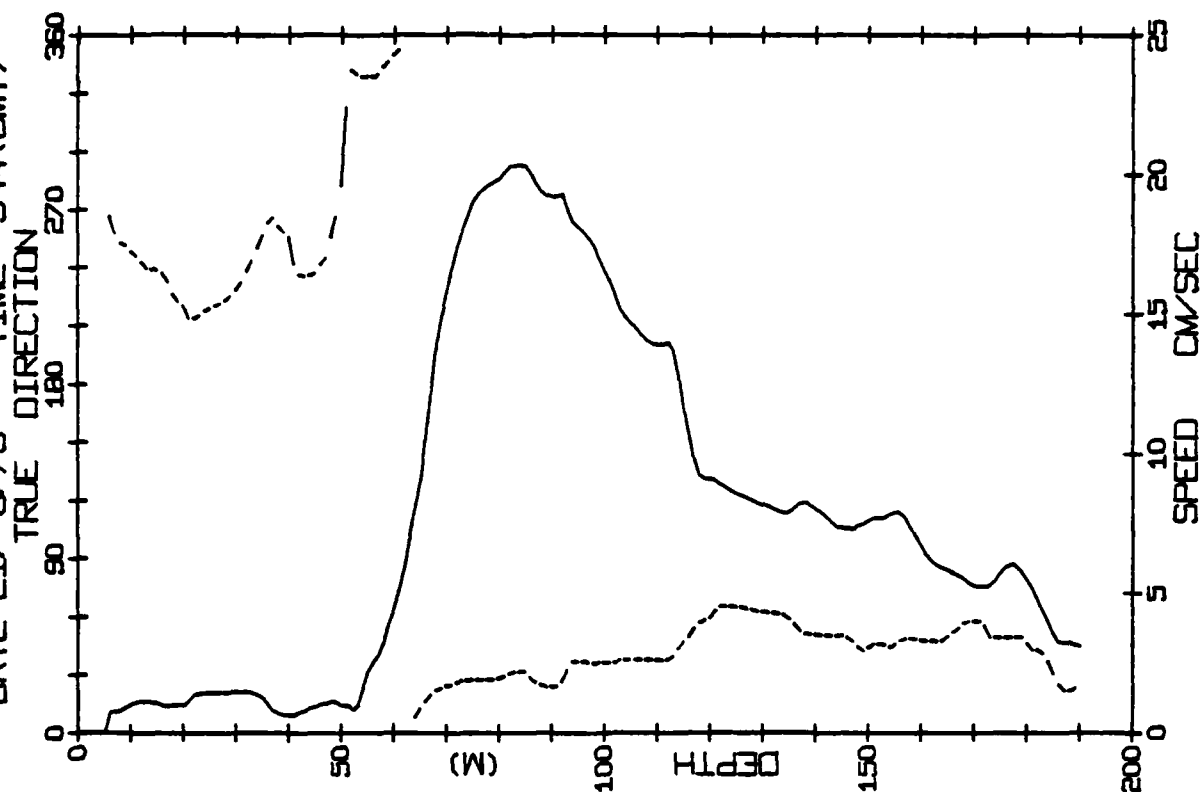
CAMP BLUE FOX STATION 86
DATE 20/ 6/75 TIME 543(GMT)

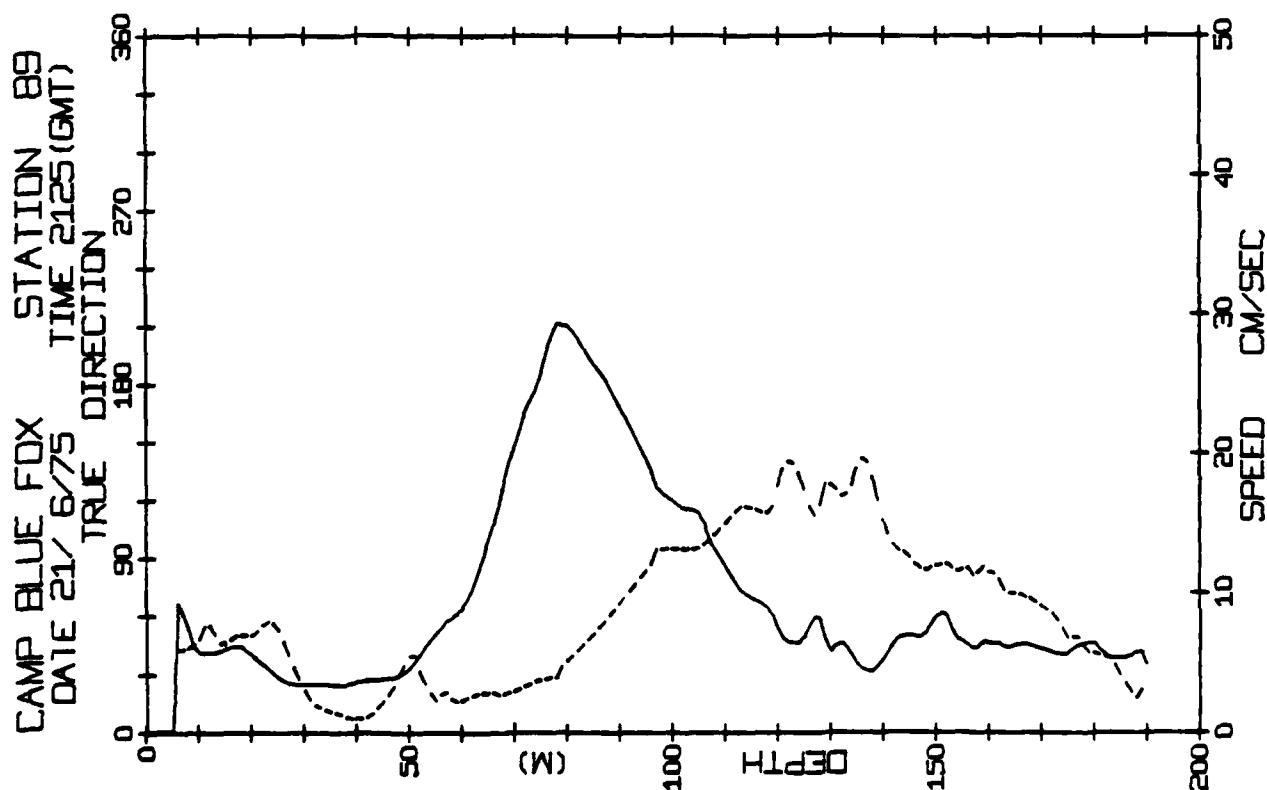
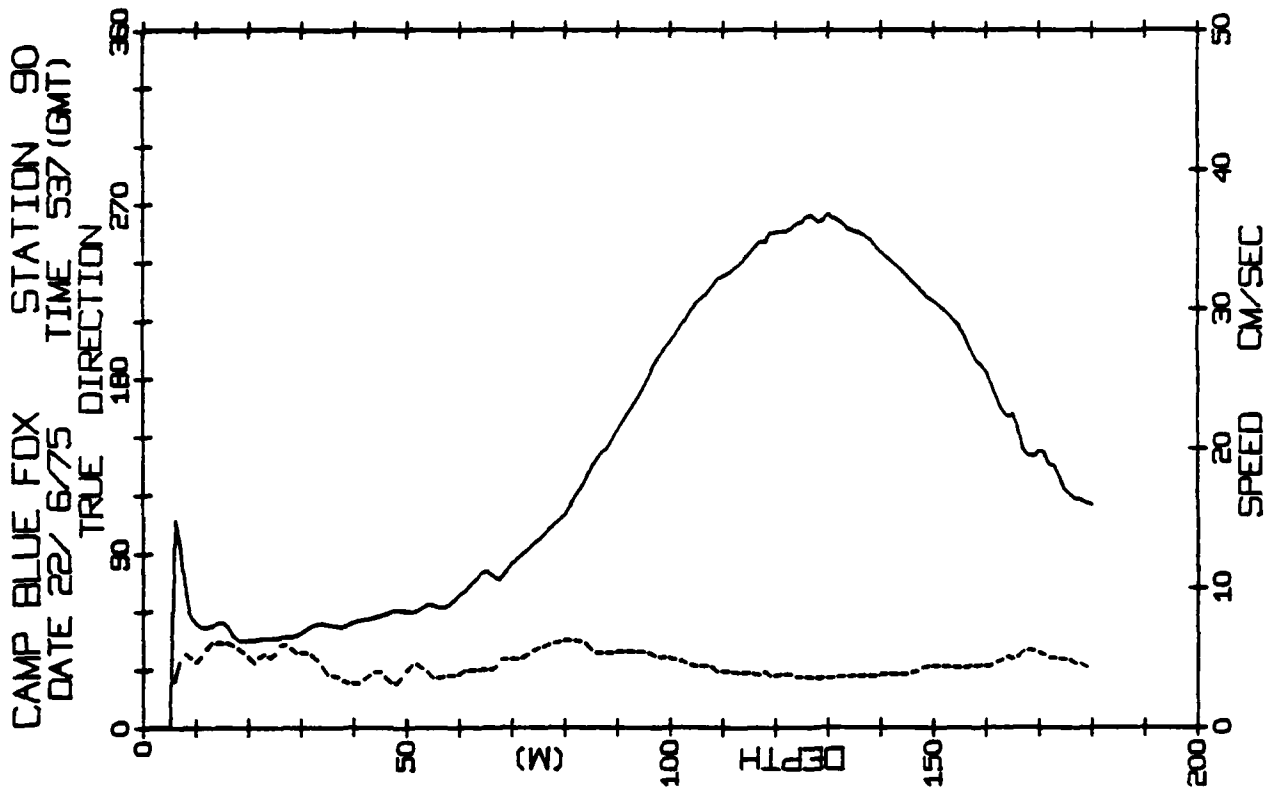


CAMP BLUE FOX STATION 87
DATE 20/ 6/75 TIME 2107 (GMT)

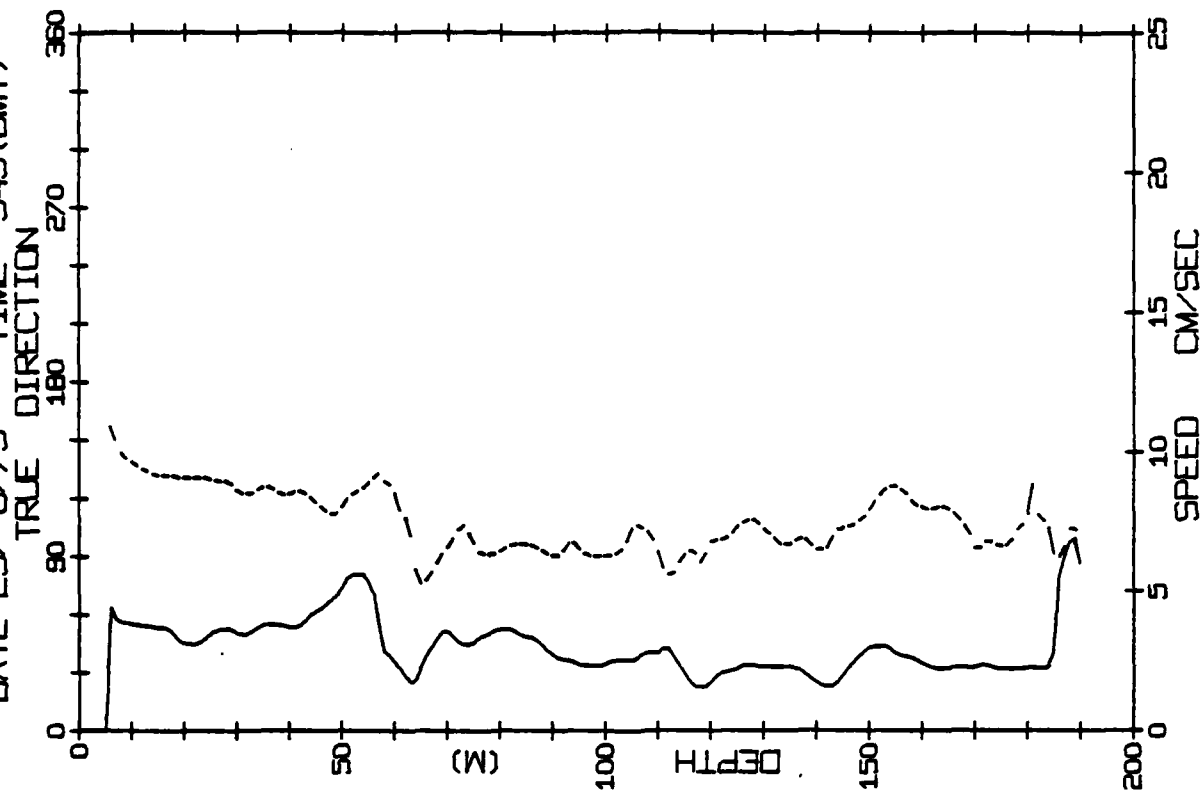


CAMP BLUE FOX STATION 88
DATE 21/ 6/75 TIME 544 (GMT)

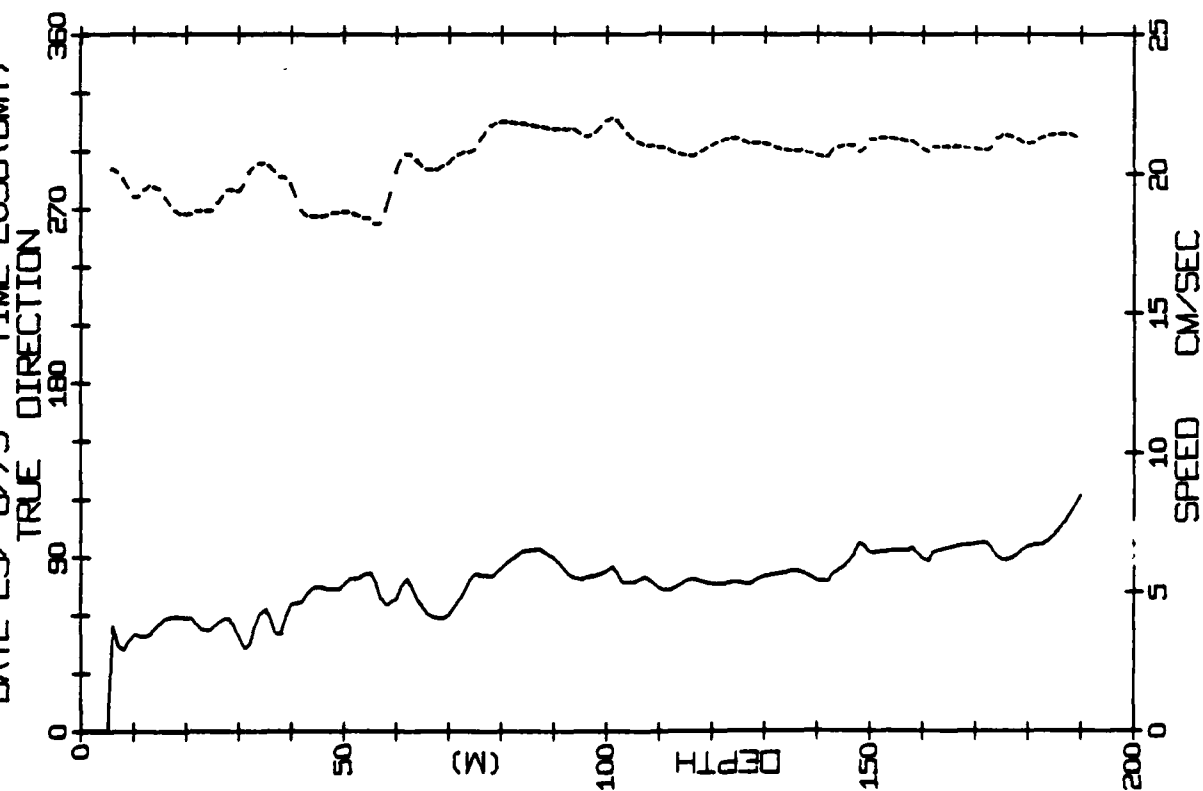




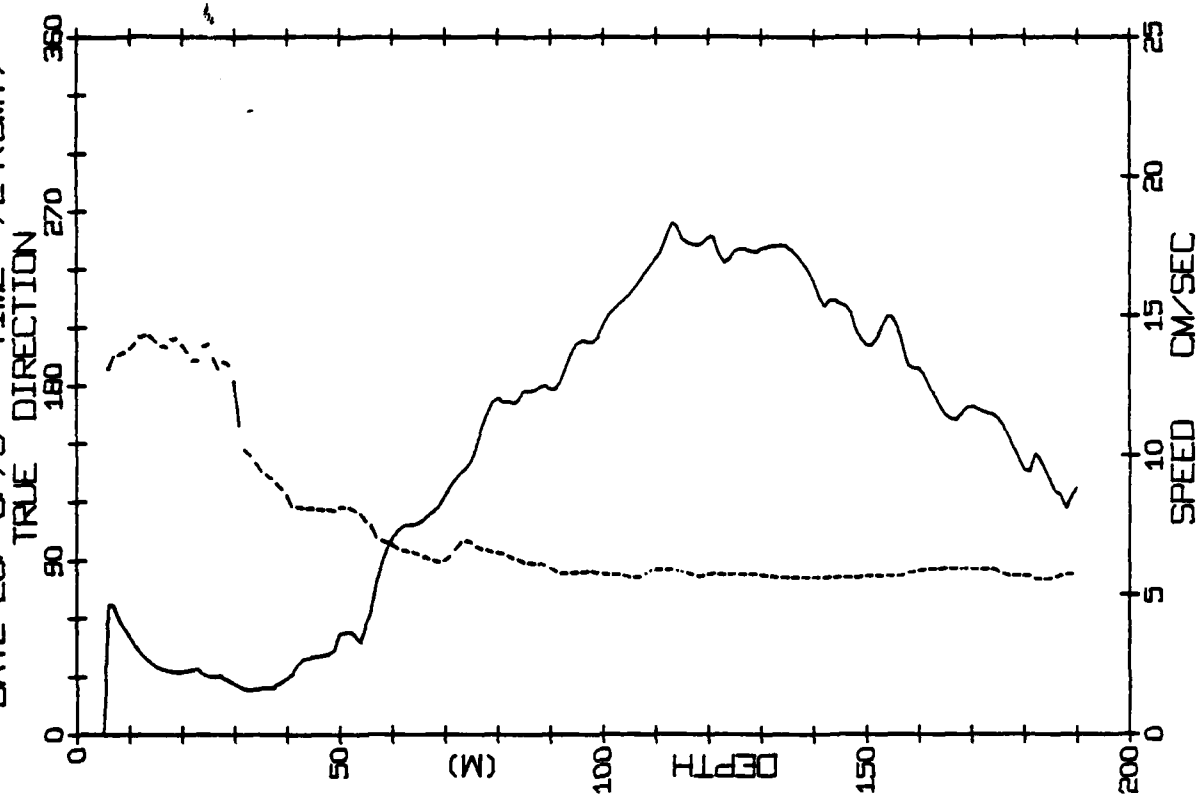
CAMP BLUE FOX STATION 96
DATE 25/ 6/75 TIME 545(GMT)



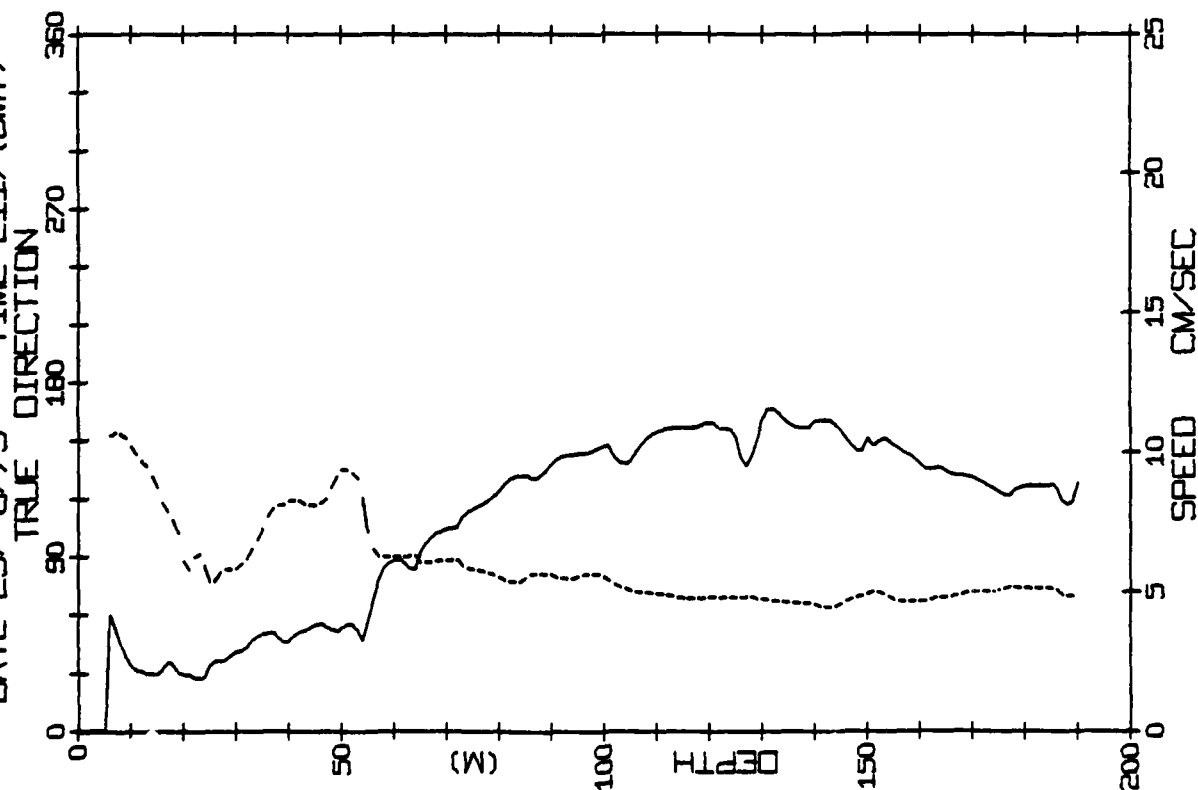
CAMP BLUE FOX STATION 93
DATE 23/ 6/75 TIME 2058(GMT)



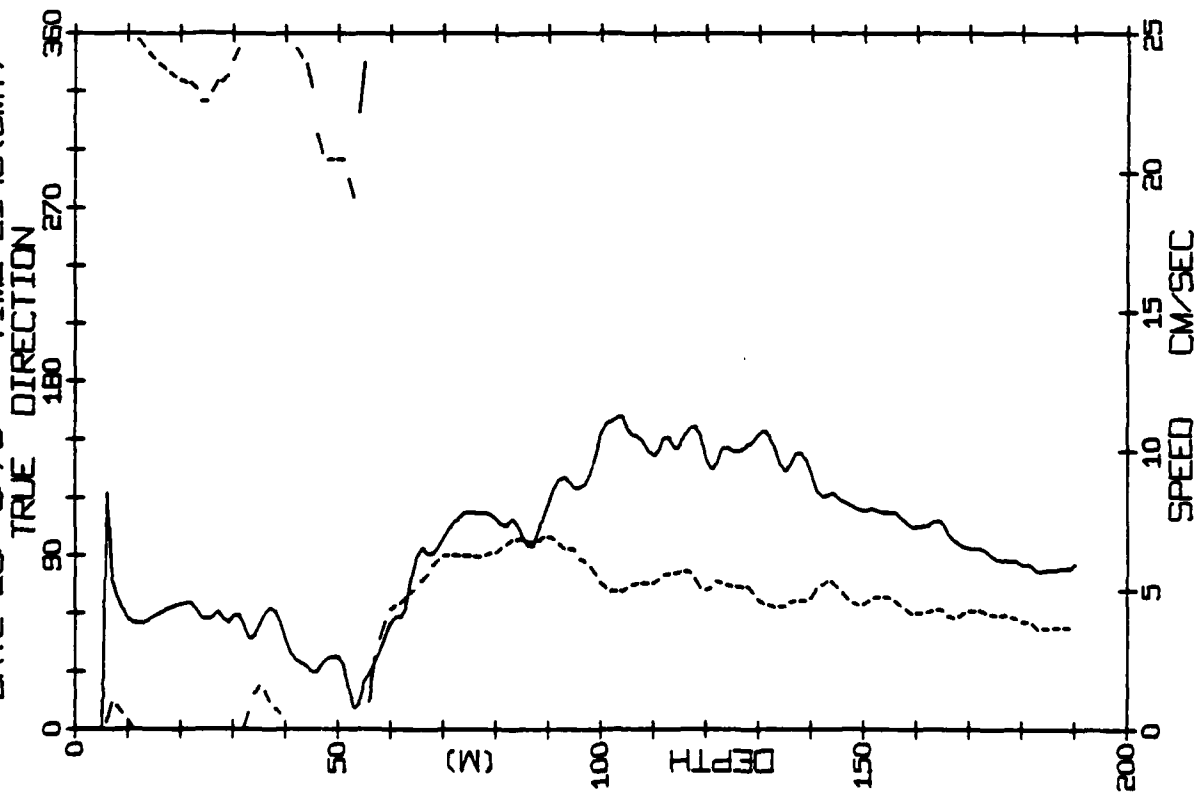
CAMP BLUE FOX STATION 98
DATE 26/ 6/75 TIME 724 (GMT)



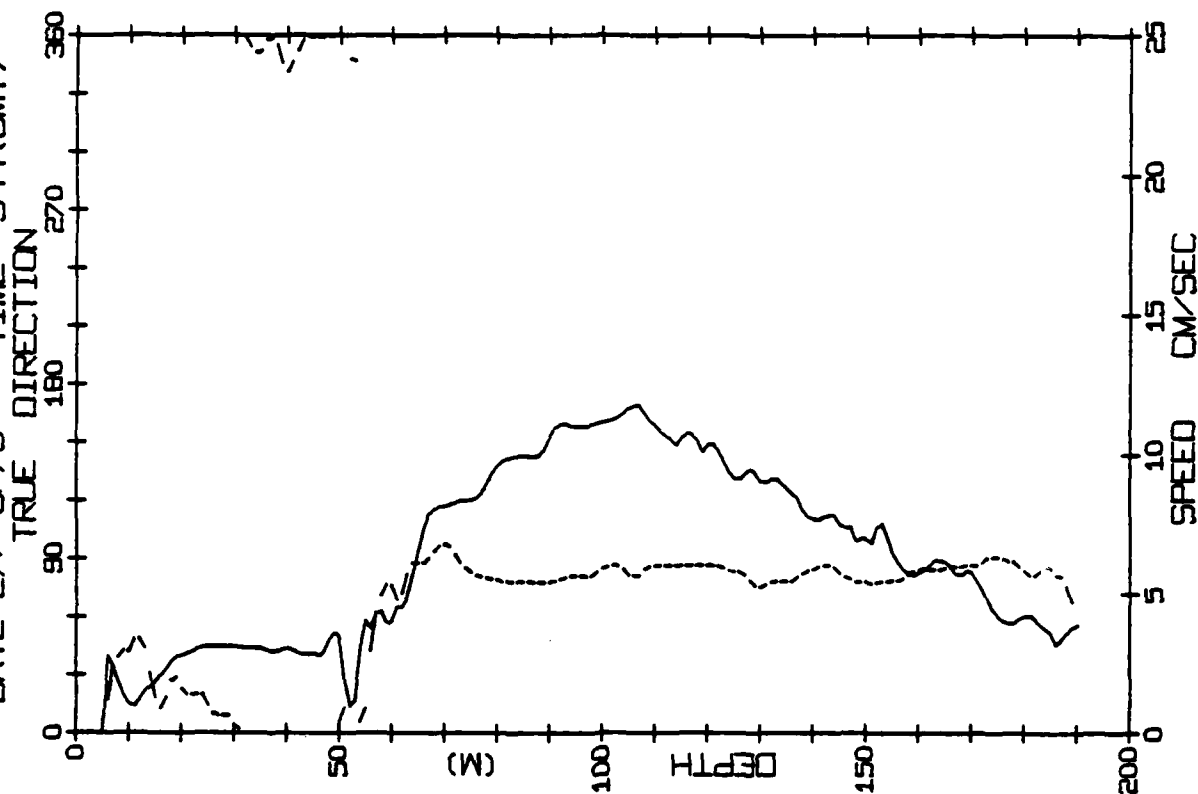
CAMP BLUE FOX STATION 97
DATE 25/ 6/75 TIME 2117 (GMT)

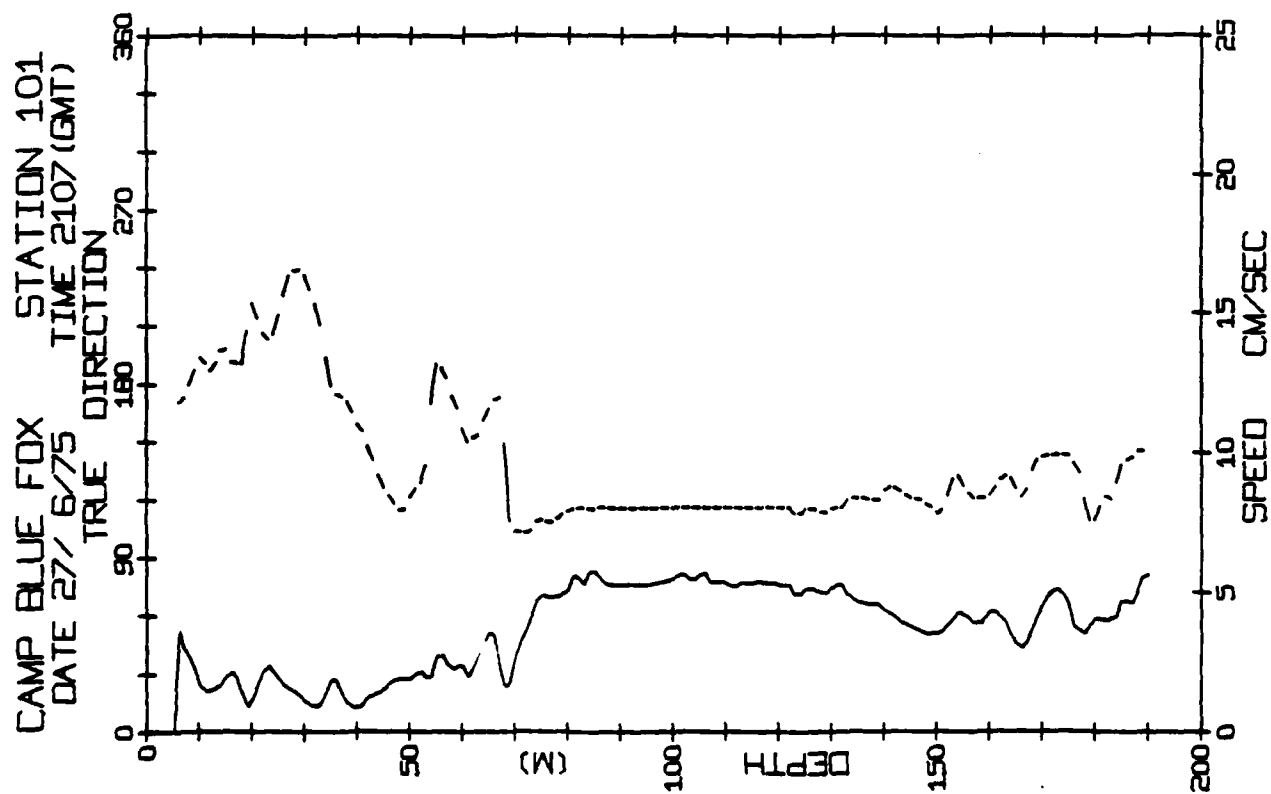
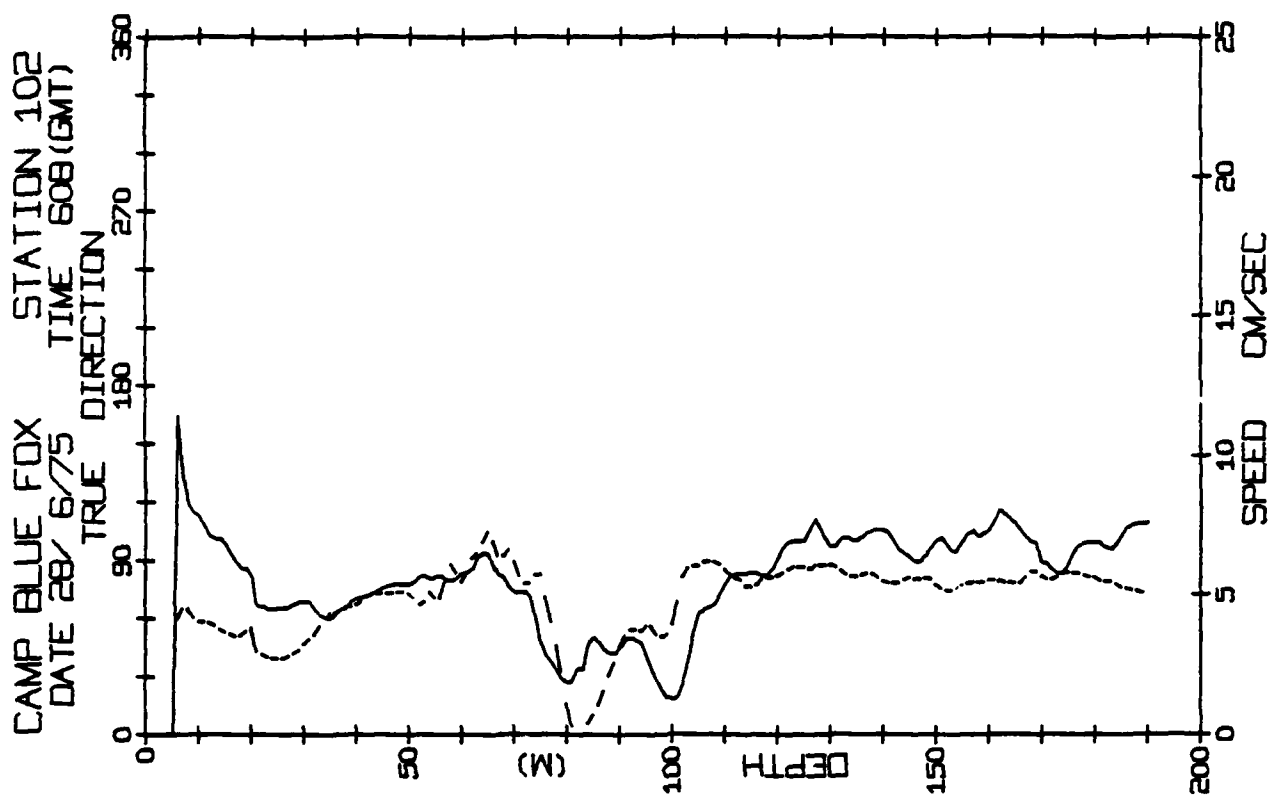


CAMP BLUE FOX STATION 99
DATE 26/ 6/75 TIME 2148 (GMT)



CAMP BLUE FOX STATION 100
DATE 27/ 6/75 TIME 544 (GMT)

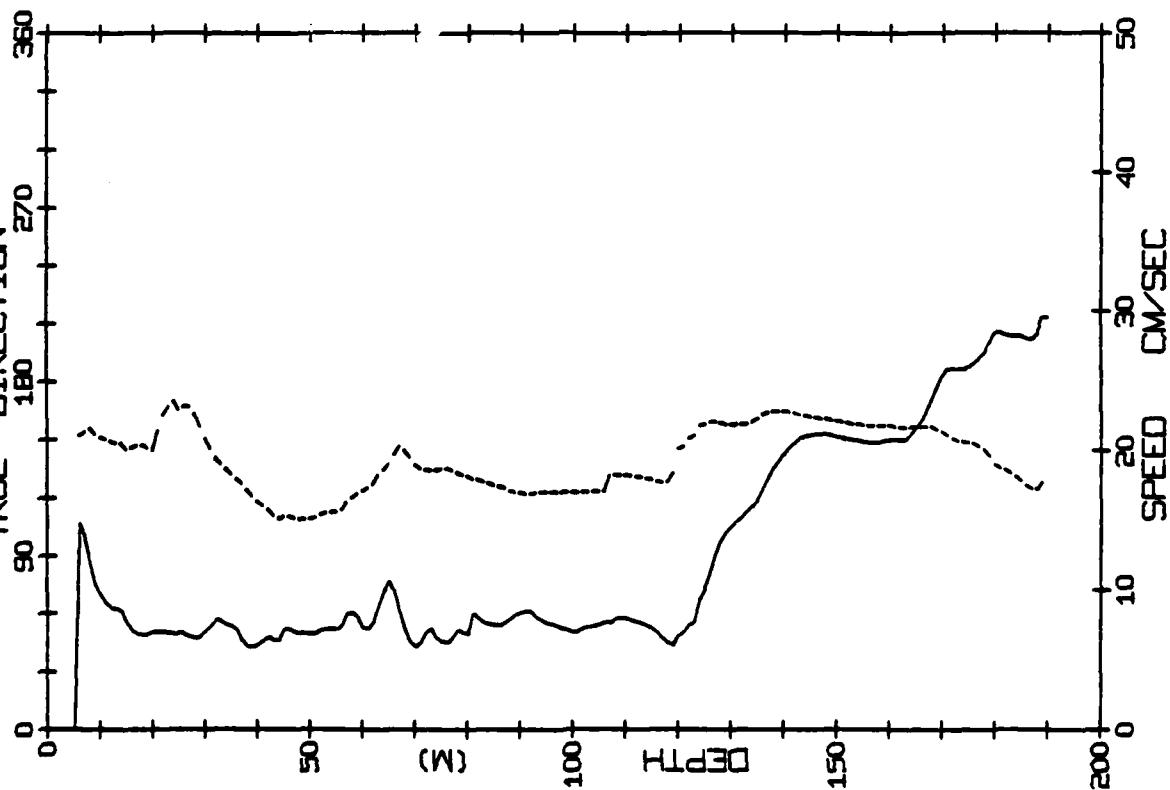




CAMP BLUE FOX
DATE 28/ 6/75

STATION 103
TIME 2114(GMT)

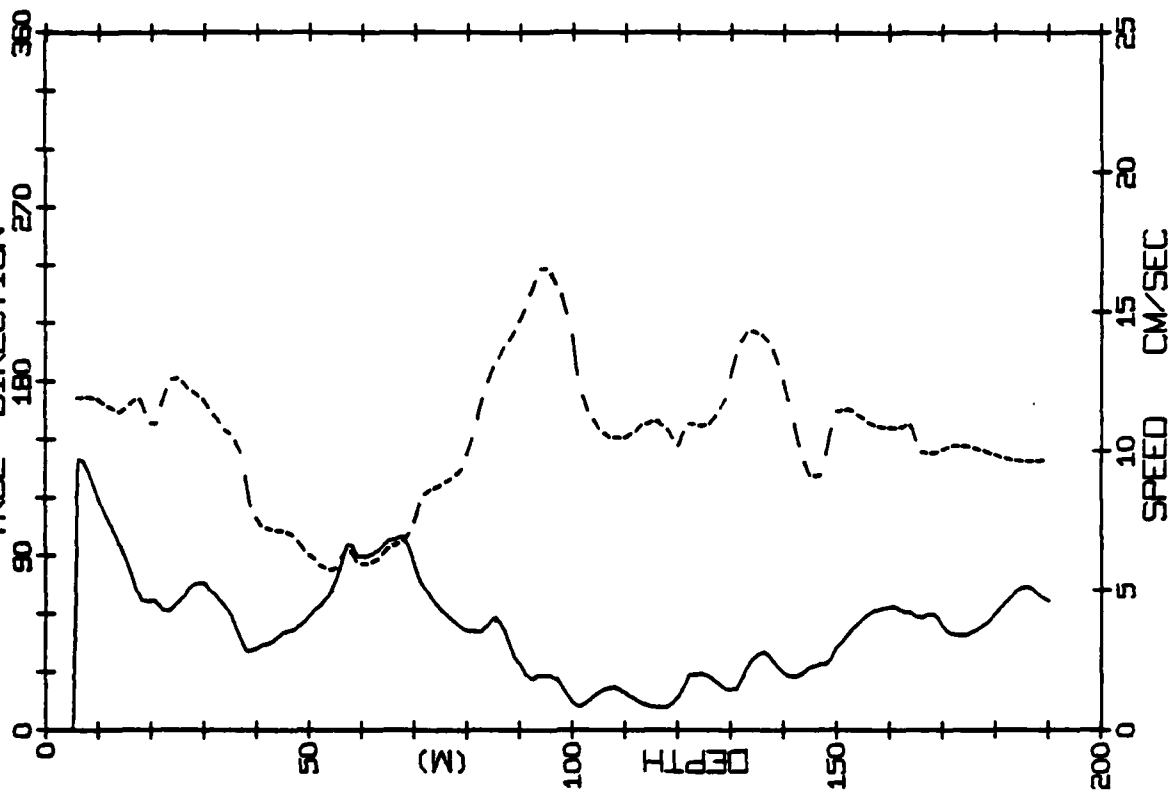
TRUE DIRECTION



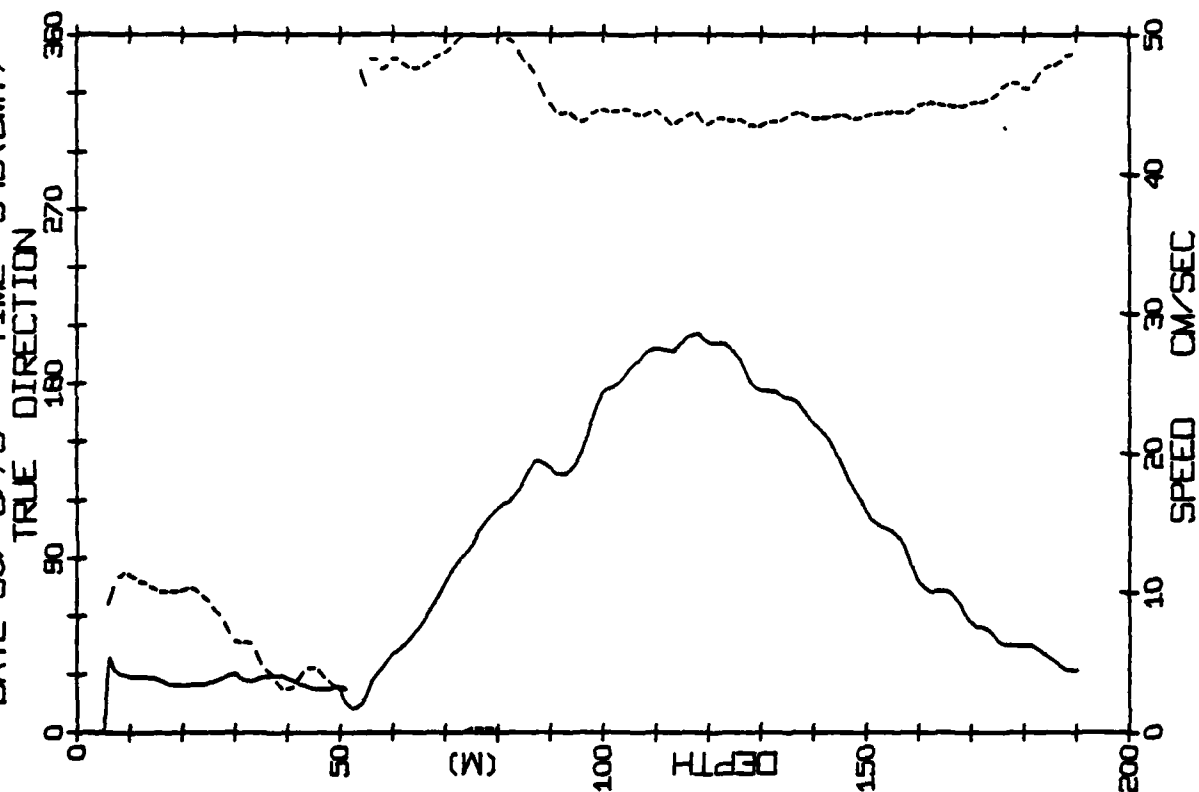
CAMP BLUE FOX
DATE 29/ 6/75

STATION 104
TIME 544(GMT)

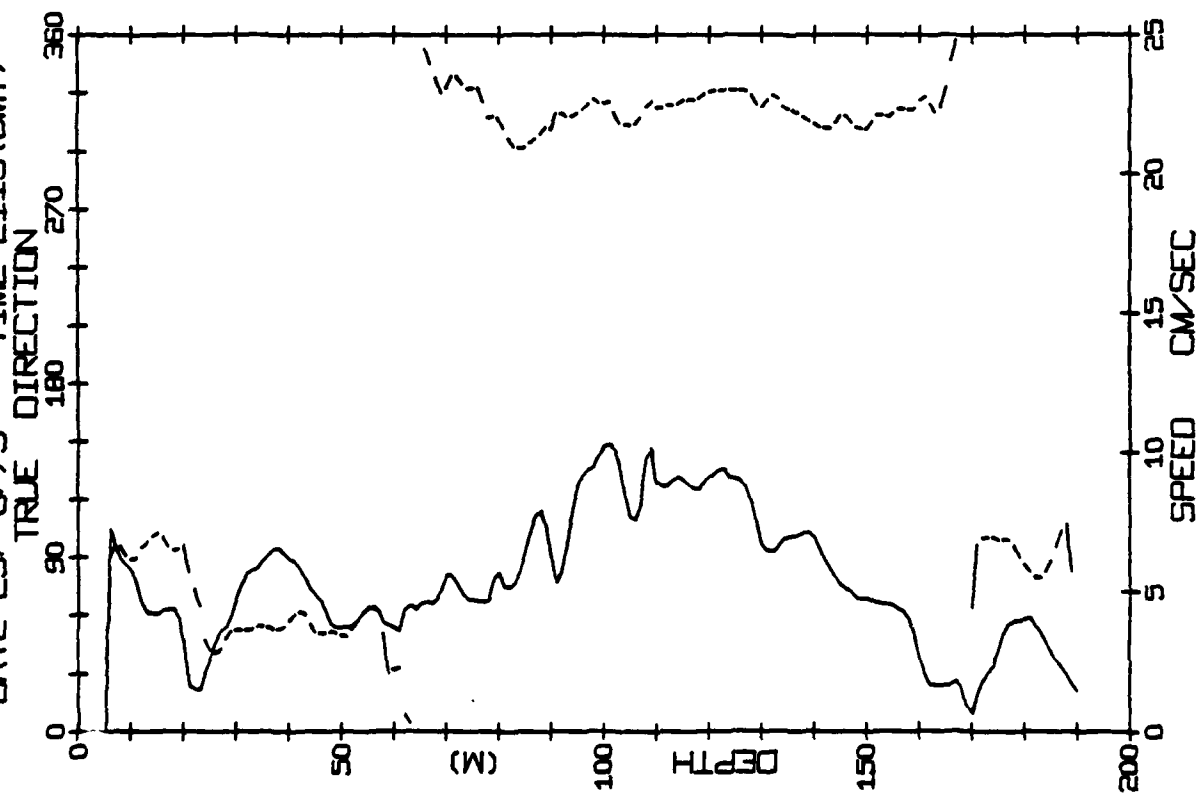
TRUE DIRECTION

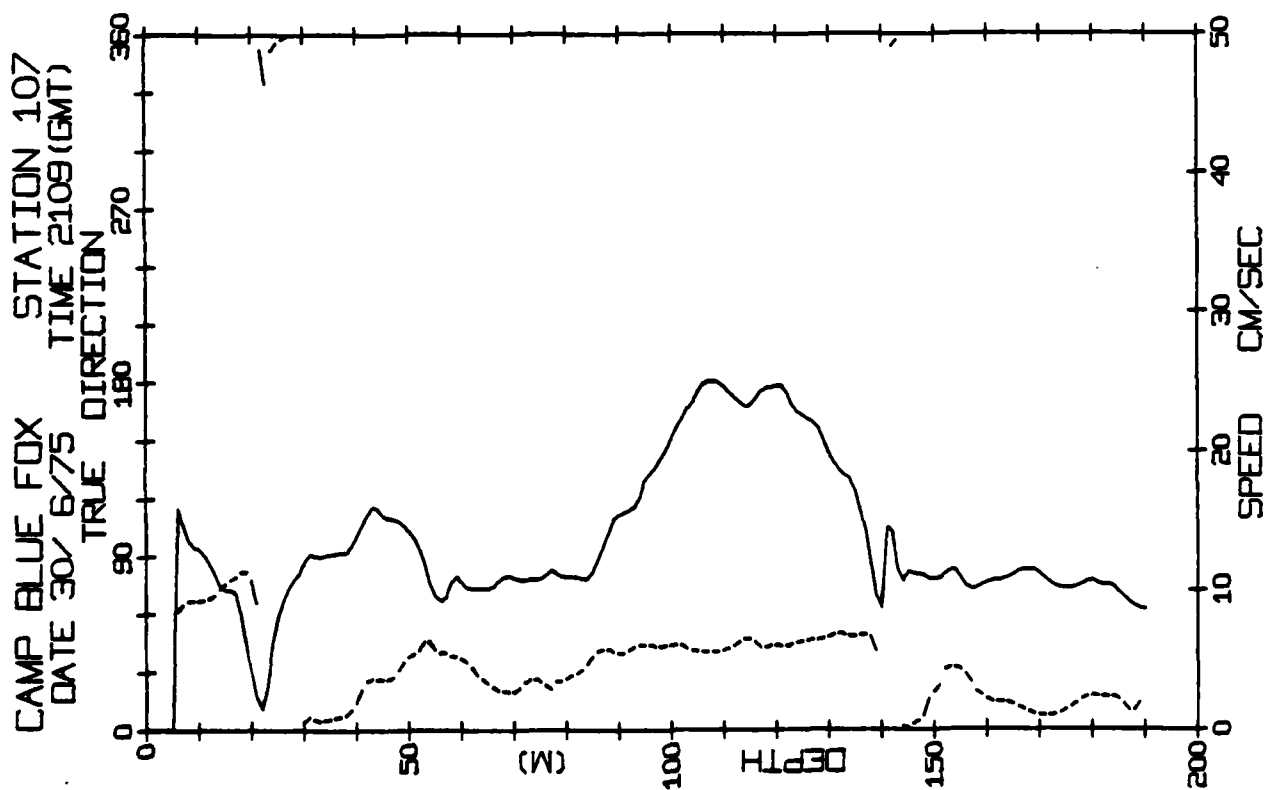
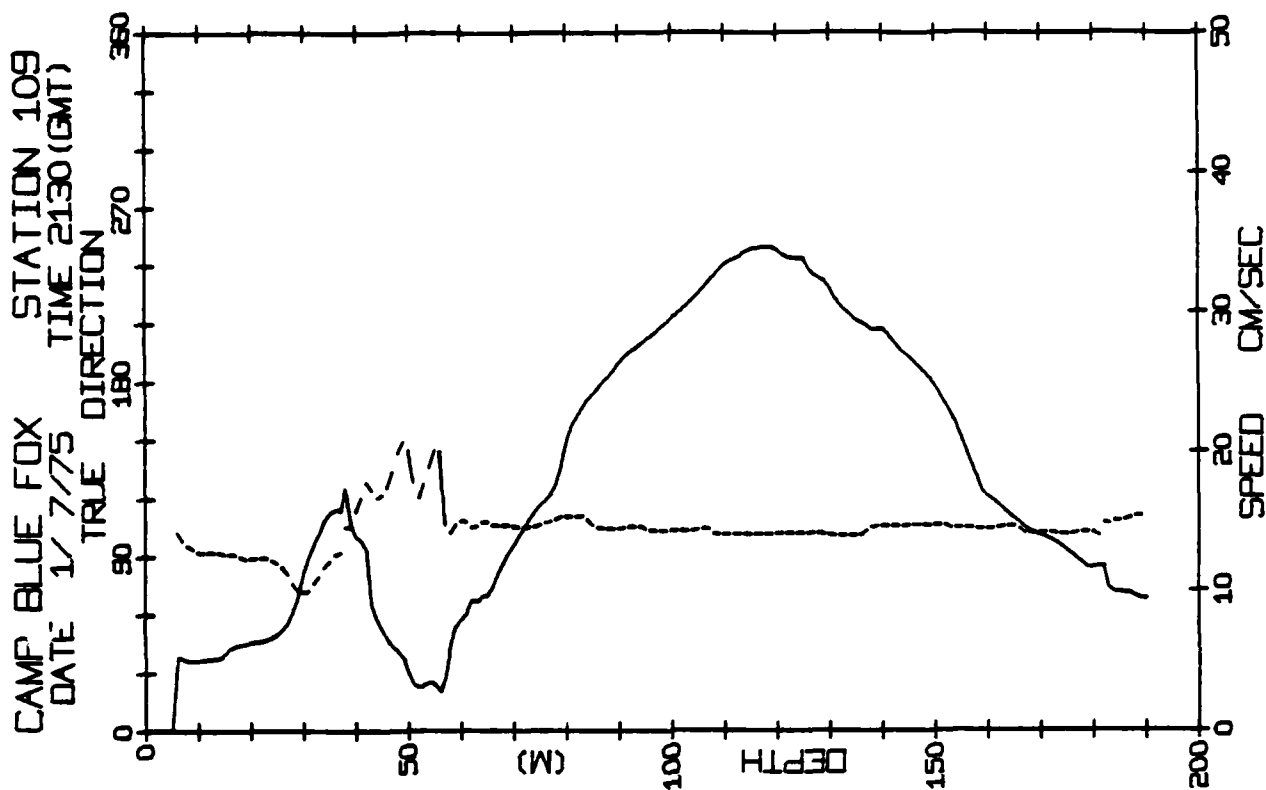


CAMP BLUE FOX STATION 106
DATE 30/ 6/75 TIME 549(GMT)



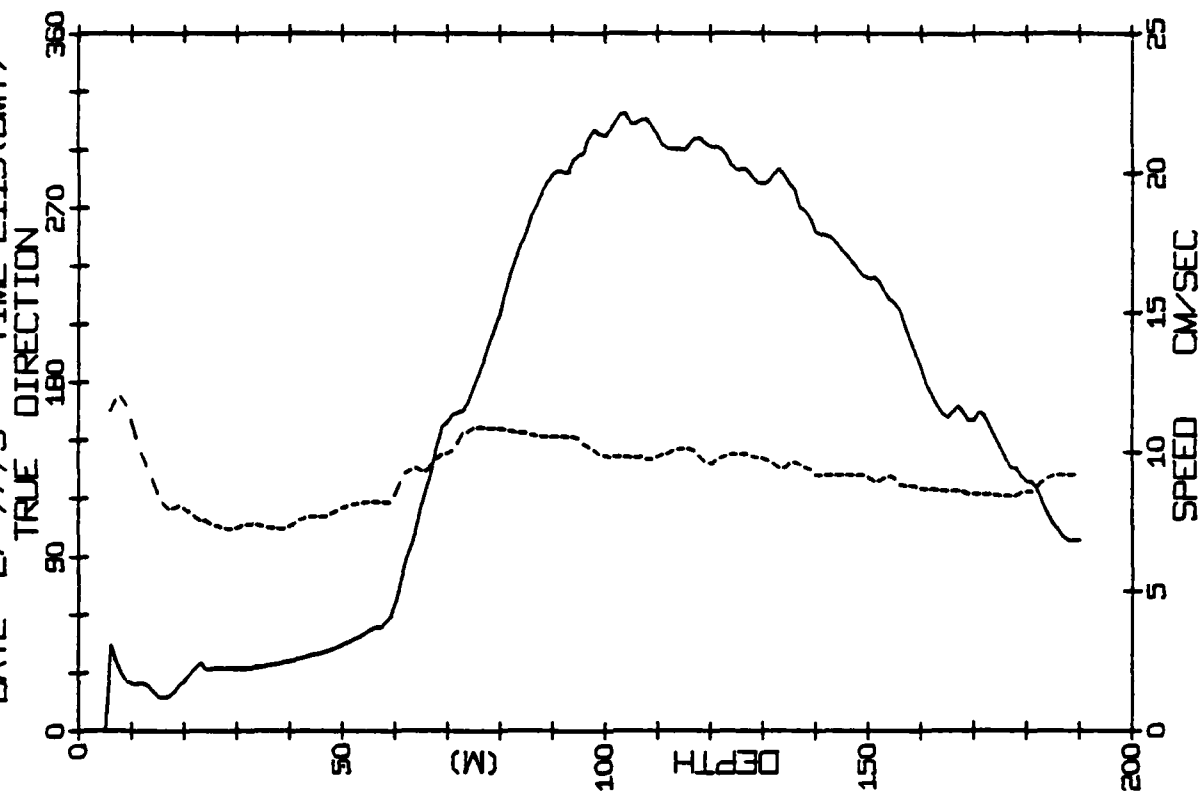
CAMP BLUE FOX STATION 105
DATE 29/ 6/75 TIME 2113(GMT)



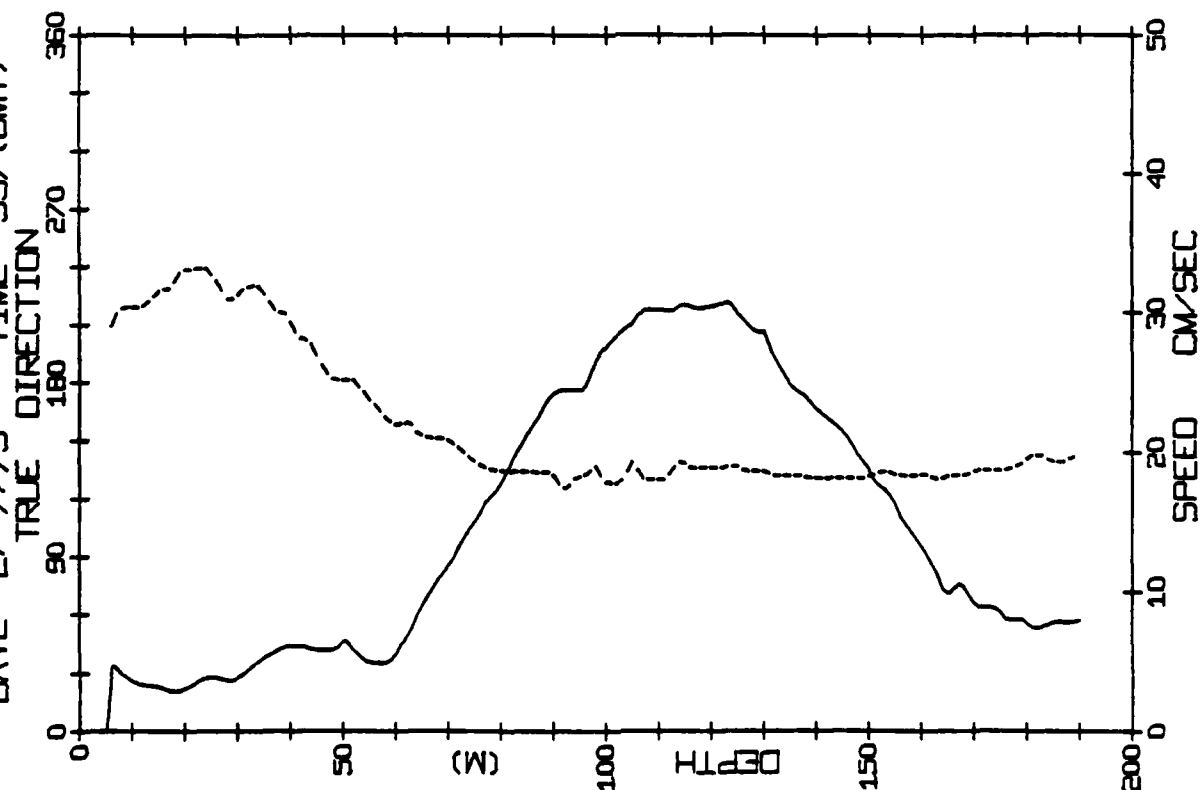


BLUE FOX STATION 107 (190M.) 30/JUN/75 2109 GMT
 LAT= 76.9040N LONG= 146.4656W LTER= 90 LQER= 113.
 NIVEL= 14.5 EIVEL= 4.9 NVER= 1. EVER= 1.

CAMP BLUE FOX STATION 111
DATE 2/7/75 TIME 2115 (GMT)

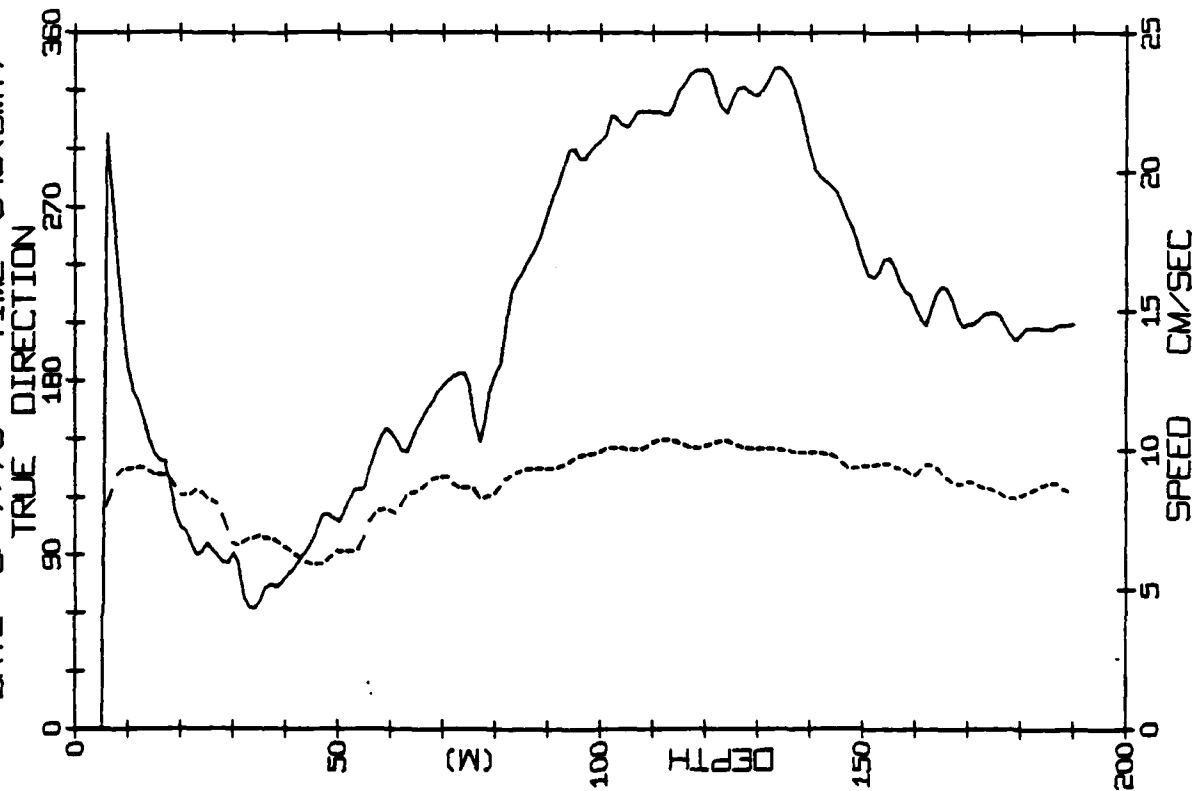


CAMP BLUE FOX STATION 110
DATE 2/7/75 TIME 537 (GMT)

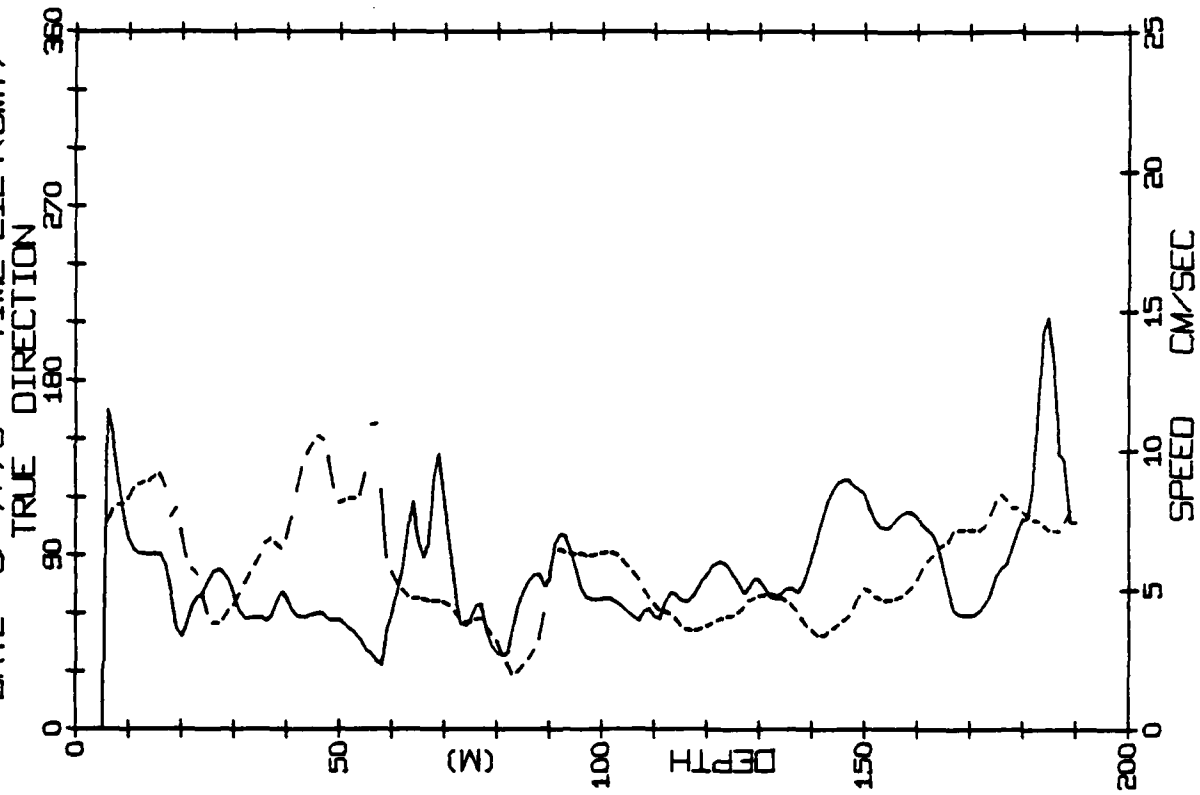


BLUE FOX STATION 110 (190M.) 2/JUL/75 537 GMT
 LAT= 76.8975N LONG= 146.0892W LTER= 50. LOER= 0.
 NIVEL= -3.9 EIVEL= 1.3 NVER= 3. EVER= 3.

CAMP BLUE FOX STATION 112
DATE 3/7/75 TIME 549(GMT)



CAMP BLUE FOX STATION 113
DATE 3/7/75 TIME 2124(GMT)

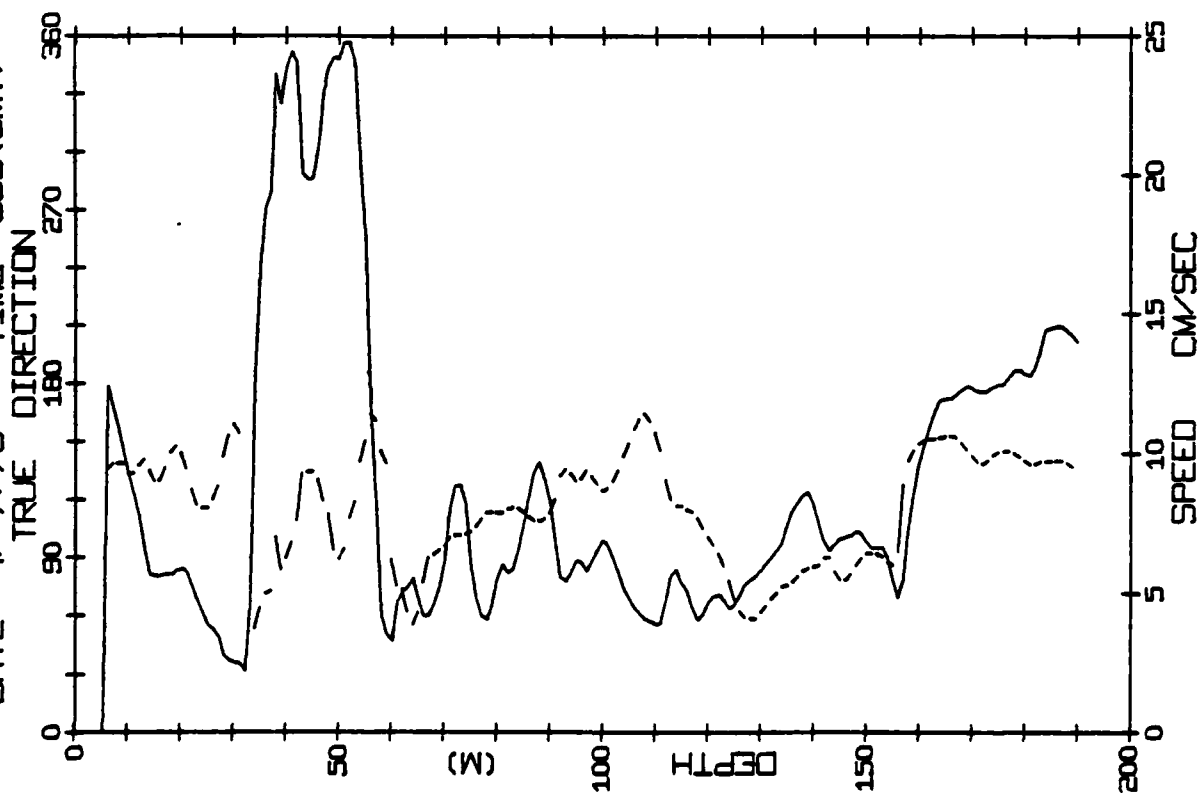


BLUE FOX STATION 113 (190M.)
LAT= 76.9078N LONG= 143.5908W
EIVEL= 4.4 EIVEL= 10.1

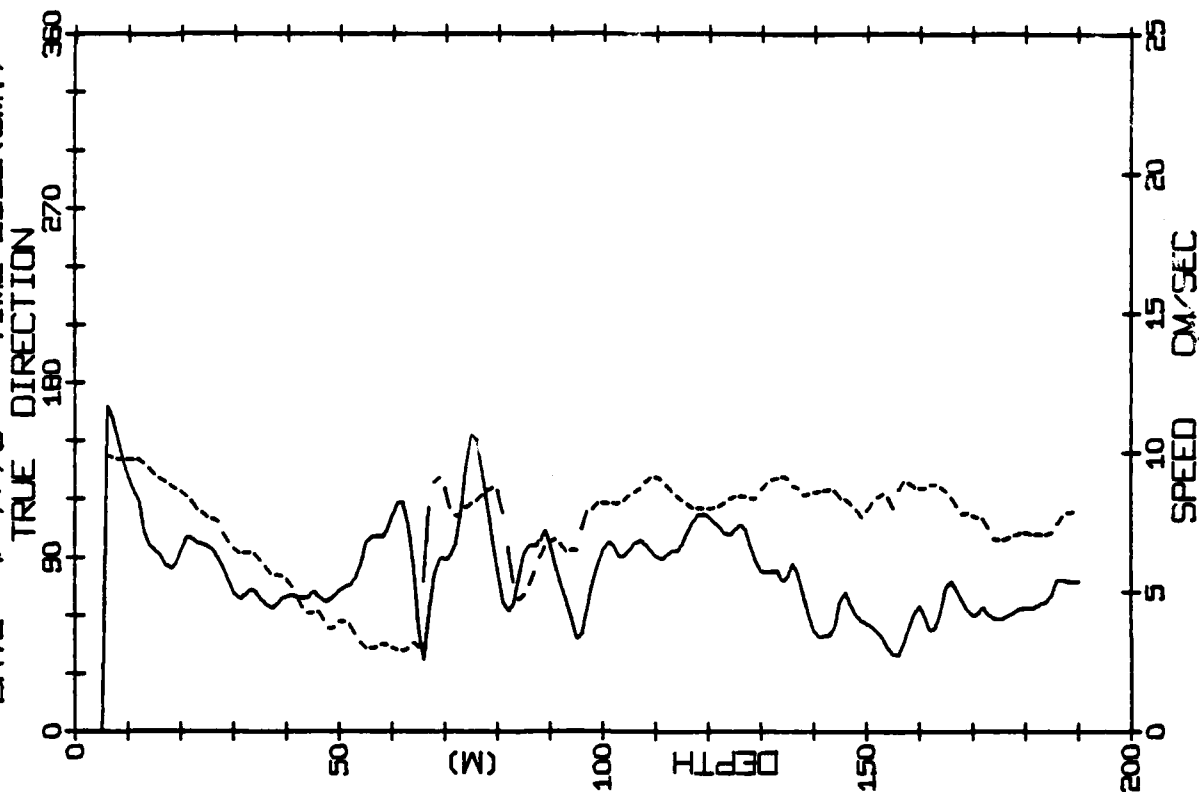
2 (190M.)
- 143.9228W
L- 18.2

BLUE F-7
LAT= 7
NIVEL=

CAMP BLUE FOX STATION 114
DATE 4/7/75 TIME 558(GMT)

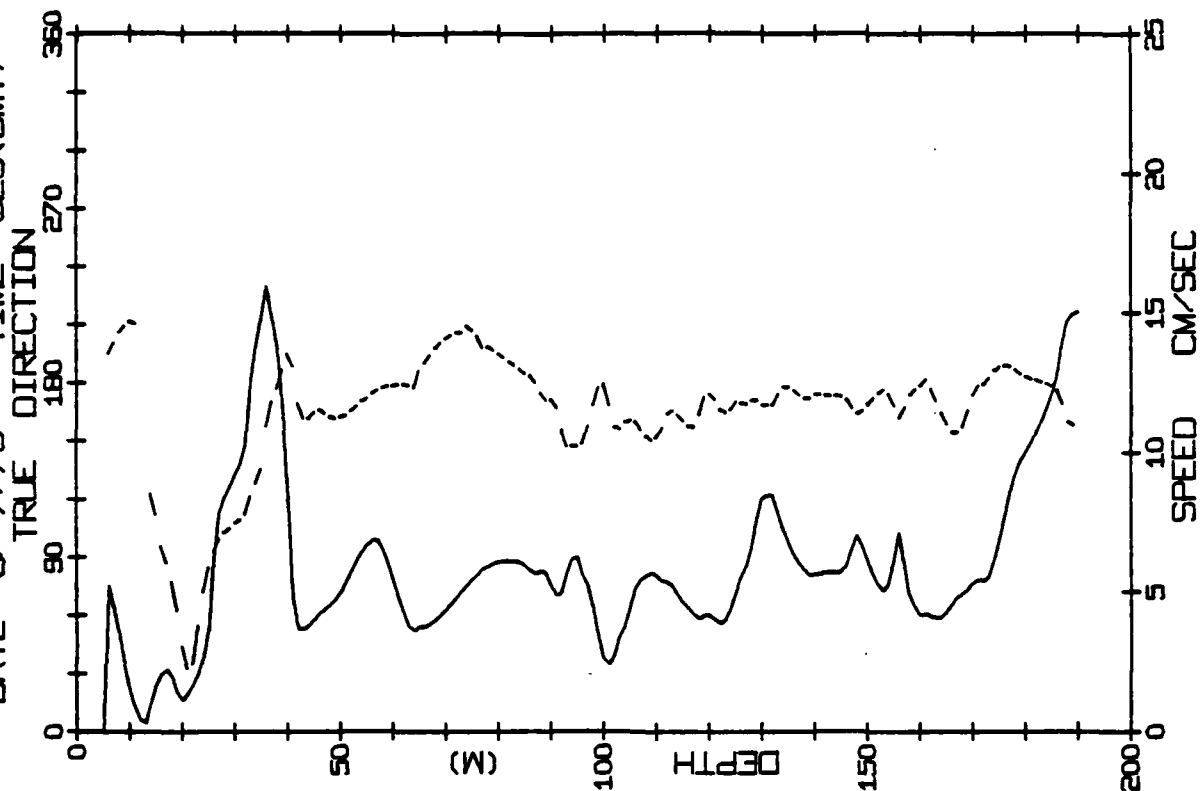


CAMP BLUE FOX STATION 115
DATE 4/7/75 TIME 2112(GMT)

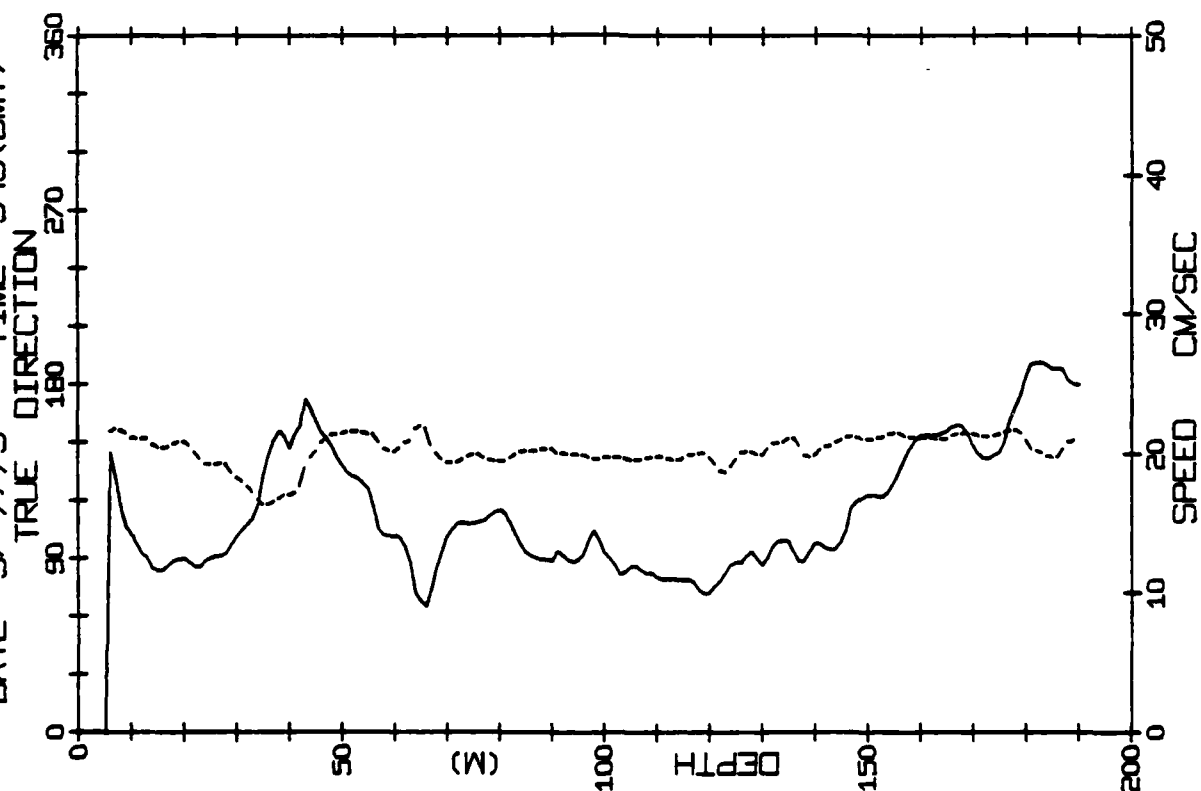


BLUE FOX STATION 114 (190M.) 4/JUL/75 558 GMT
 LAT= 76.914N LONG= 145.4905W LTER= 10. LOER= 9.
 NIVEL= -3.0 EIVEL= 12.8 NVER= 1. EVER= 1.

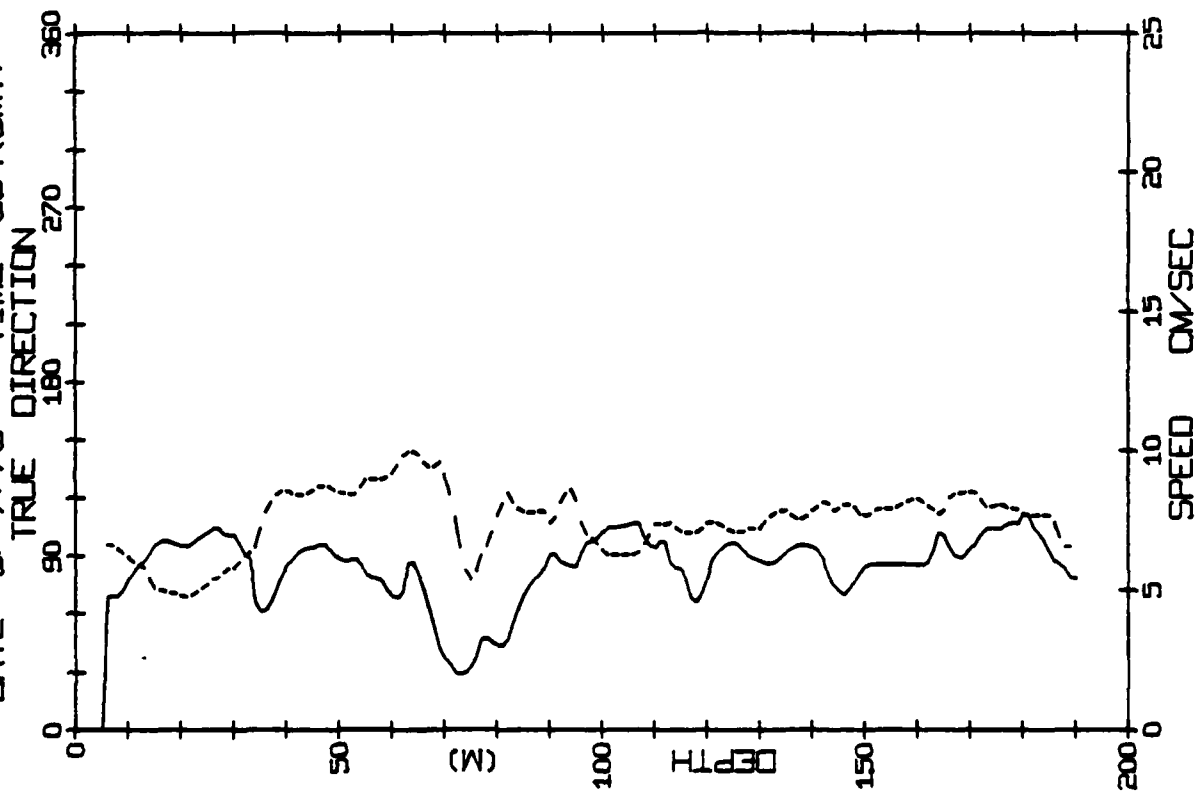
CAMP BLUE FOX STATION 122
DATE 8/7/75 TIME 523(GMT)



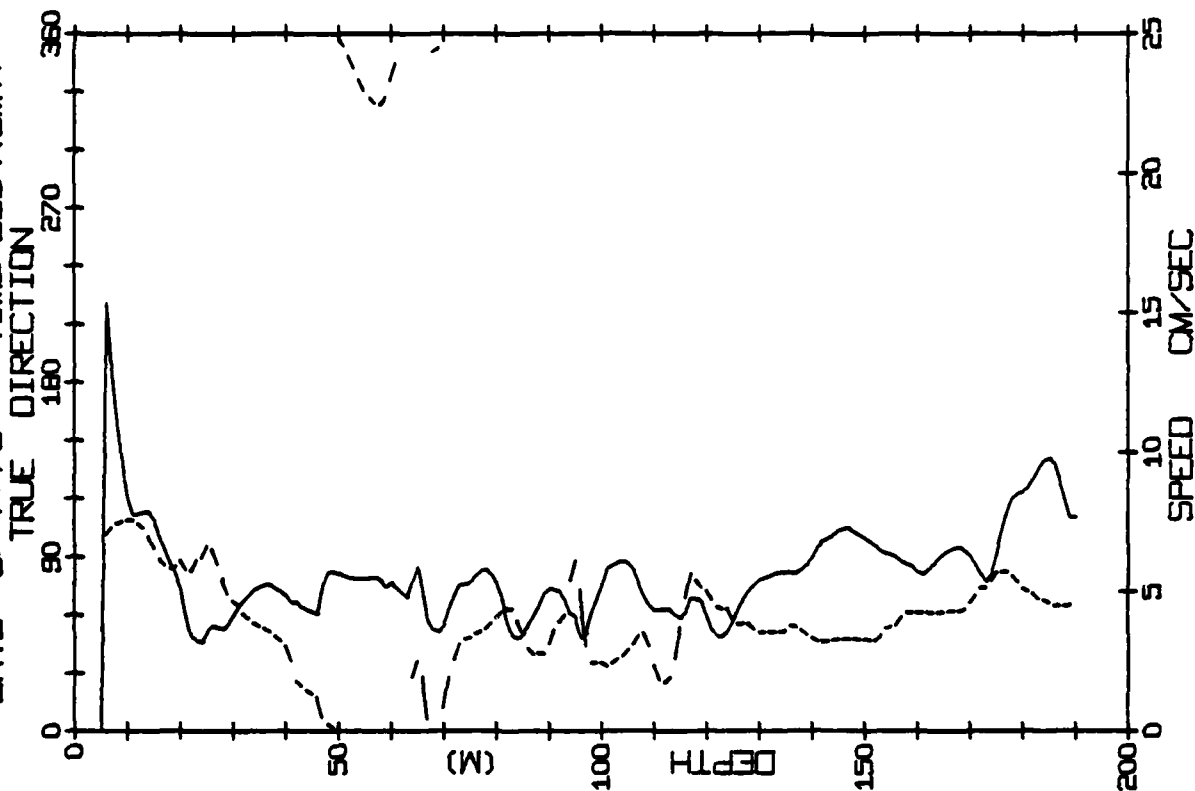
CAMP BLUE FOX STATION 116
DATE 5/7/75 TIME 549(GMT)



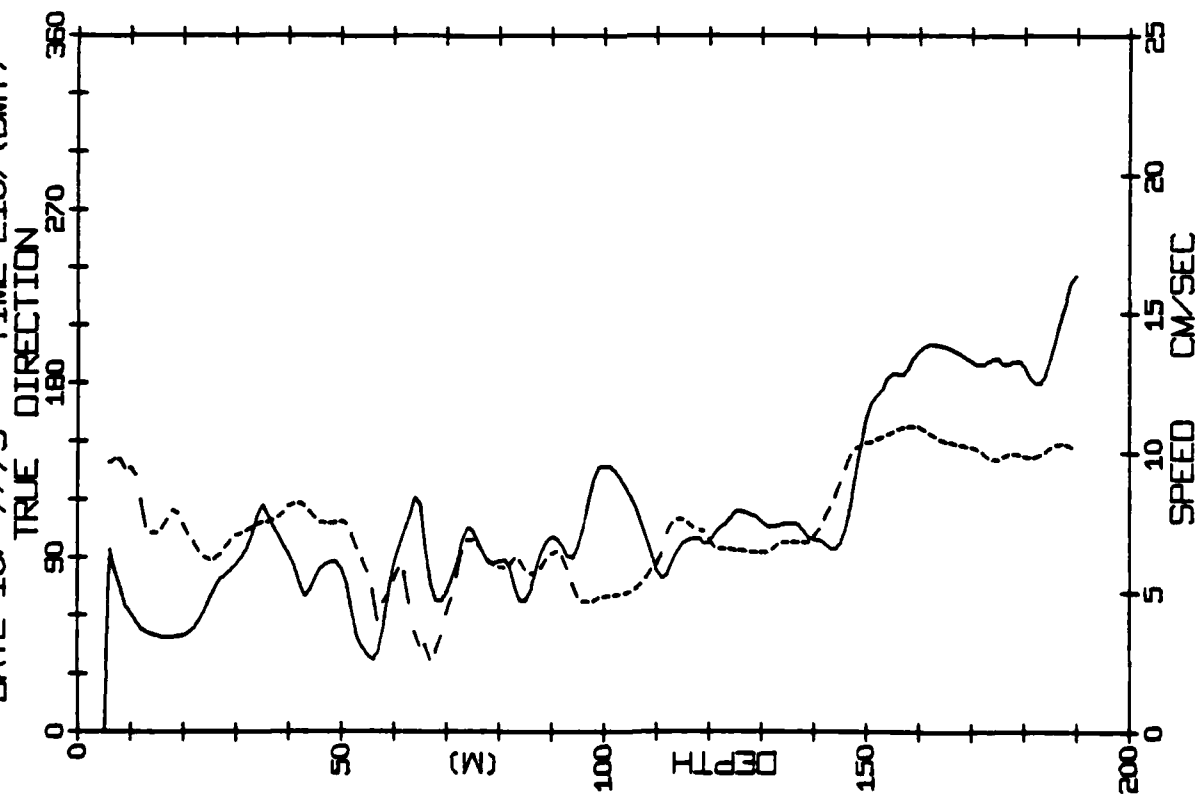
CAMP BLUE FOX STATION 124
DATE 9/7/75 TIME 554(GMT)



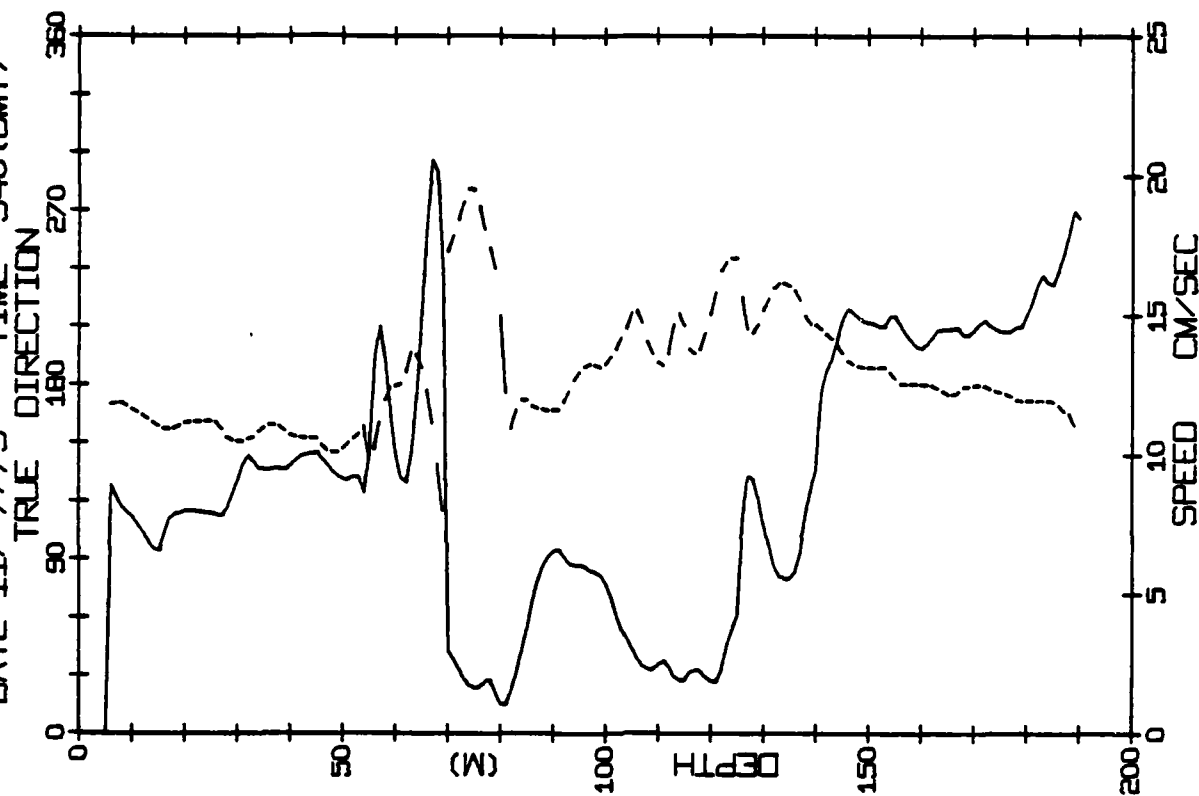
CAMP BLUE FOX STATION 125
DATE 9/7/75 TIME 2114(GMT)



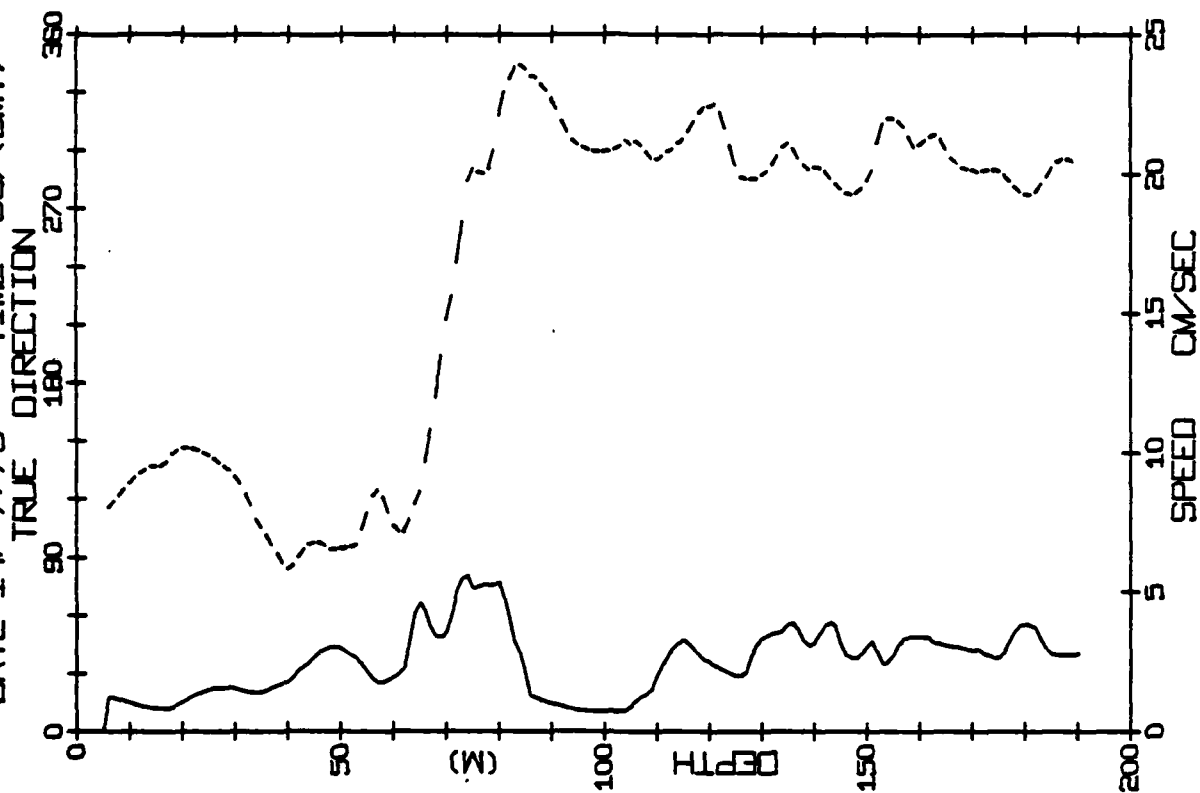
CAMP BLUE FOX STATION 127
DATE 10/7/75 TIME 2107 (GMT)



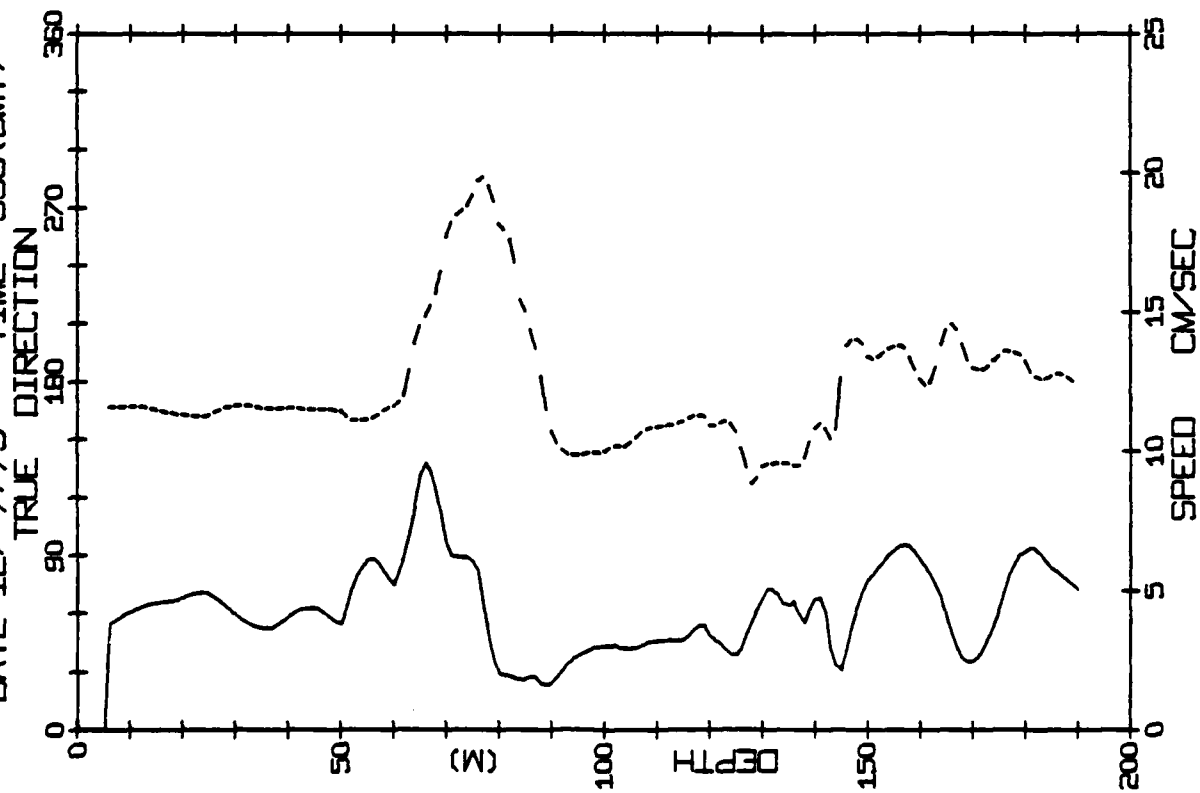
CAMP BLUE FOX STATION 128
DATE 11/7/75 TIME 540 (GMT)



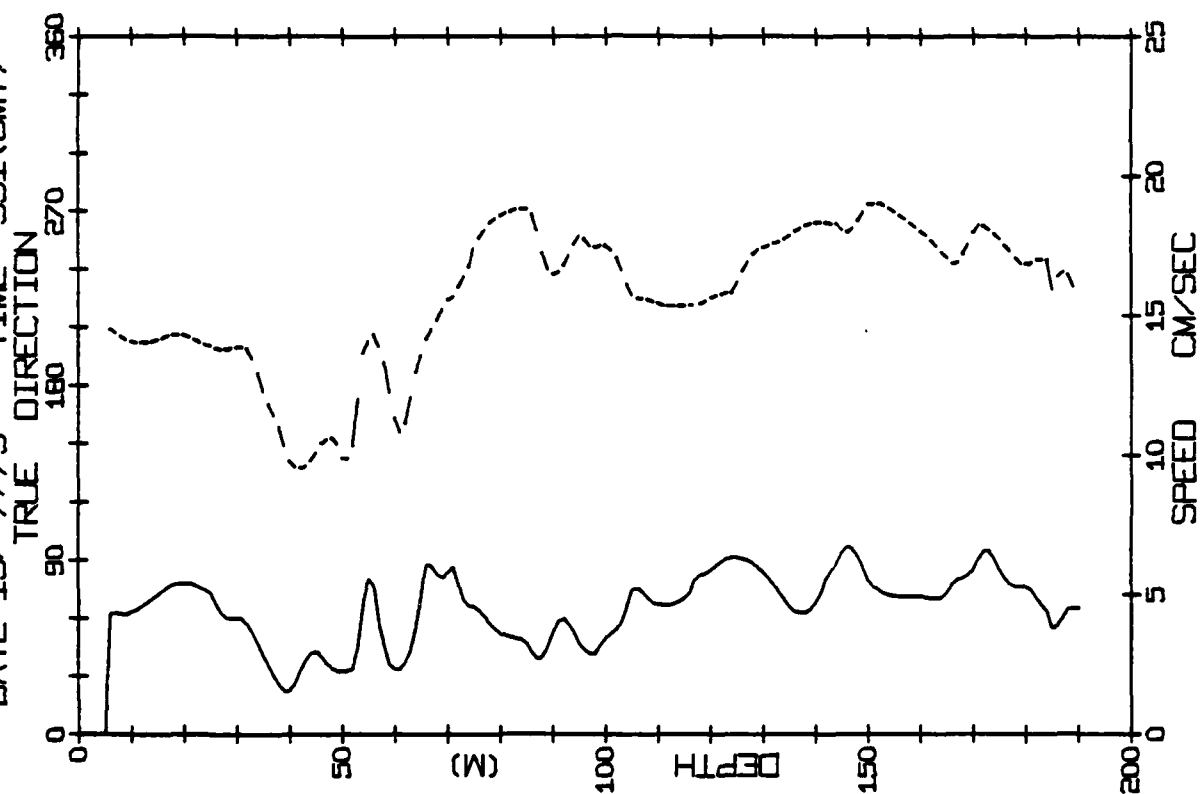
CAMP BLUE FOX STATION 134
DATE 14/ 7/75 TIME 537 (GMT)



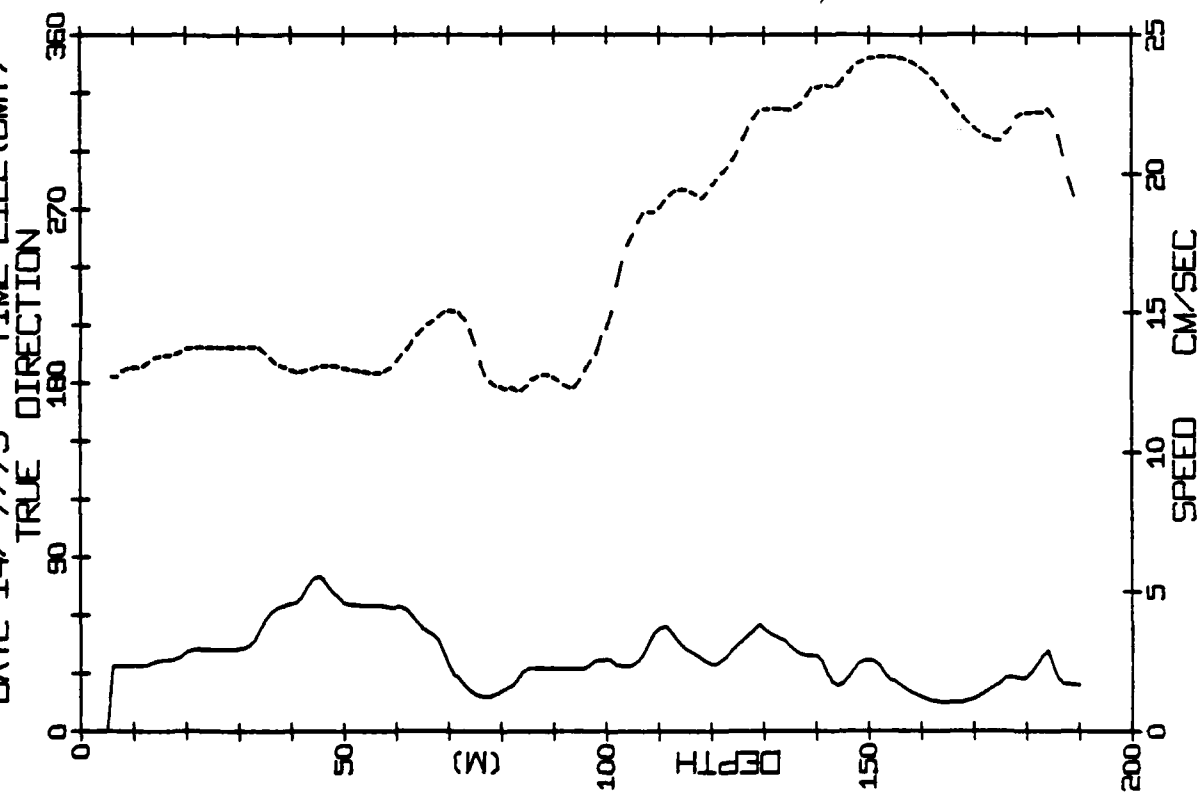
CAMP BLUE FOX STATION 130
DATE 12/ 7/75 TIME 538 (GMT)



CAMP BLUE FOX STATION 136
DATE 15/ 7/75 TIME 551 (GMT)

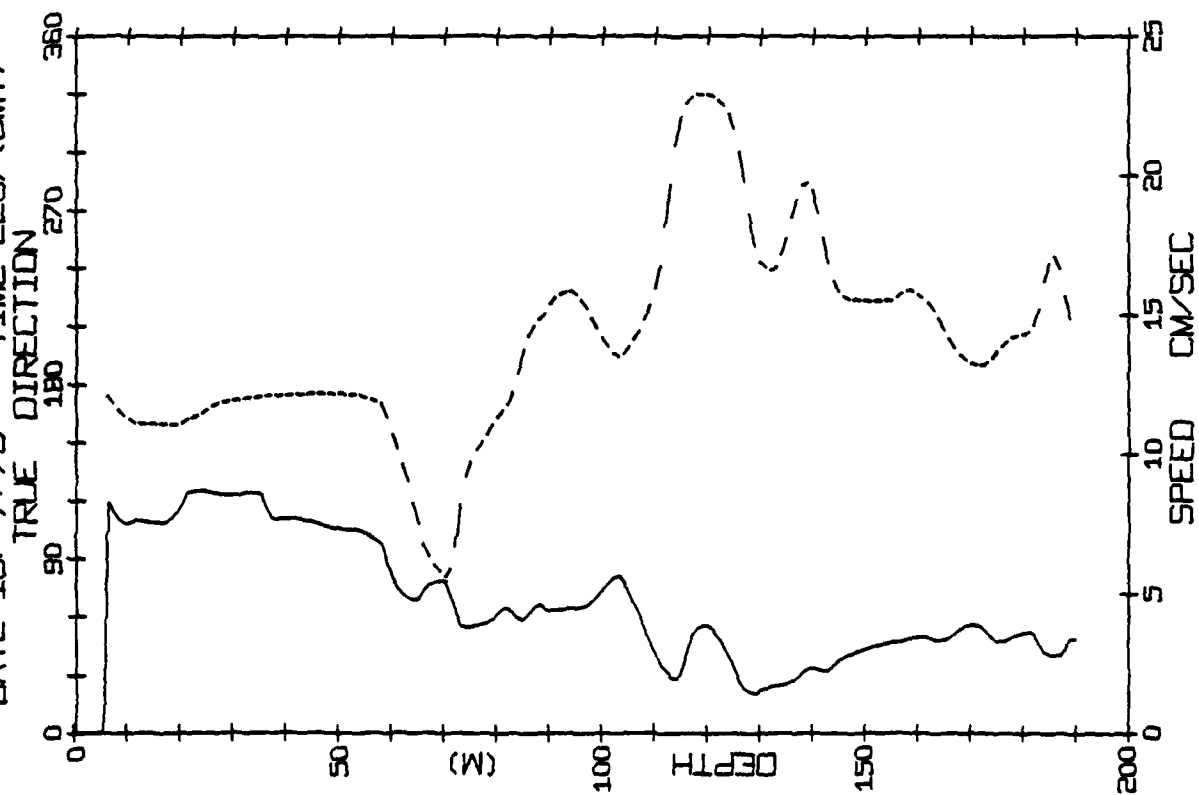


CAMP BLUE FOX STATION 135
DATE 14/ 7/75 TIME 2122 (GMT)

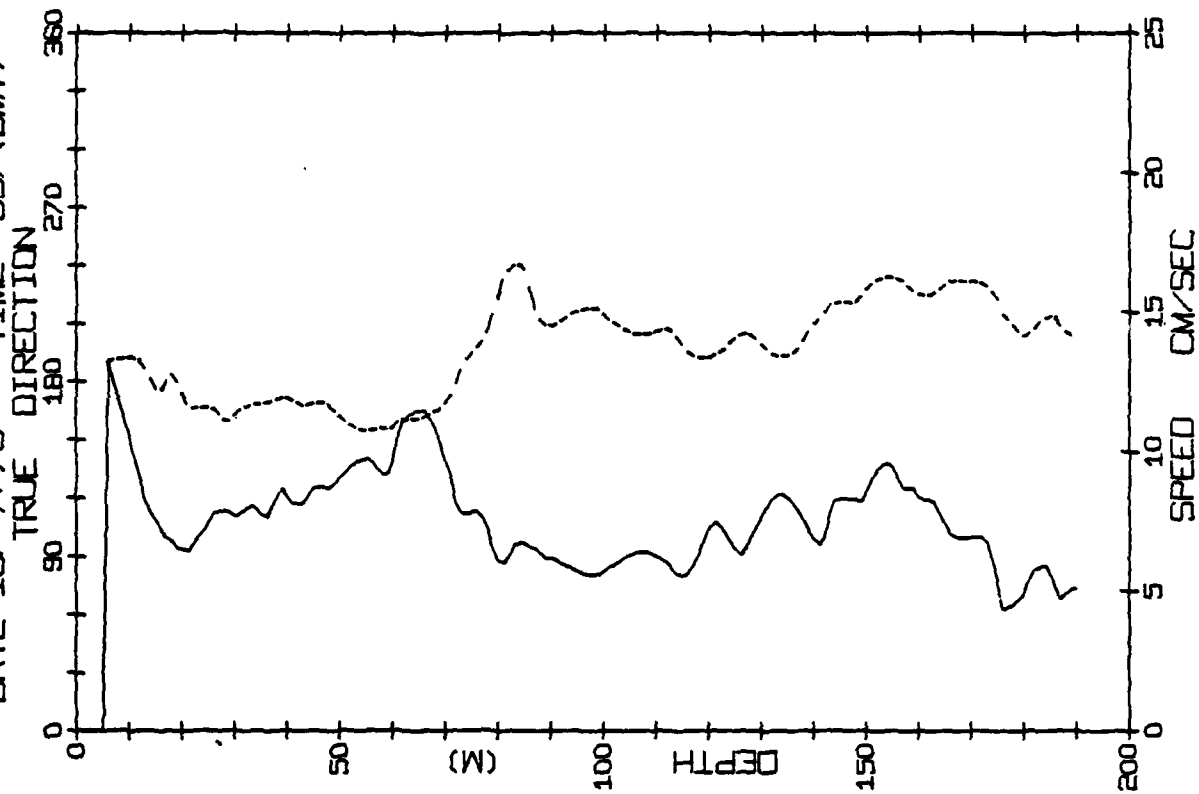


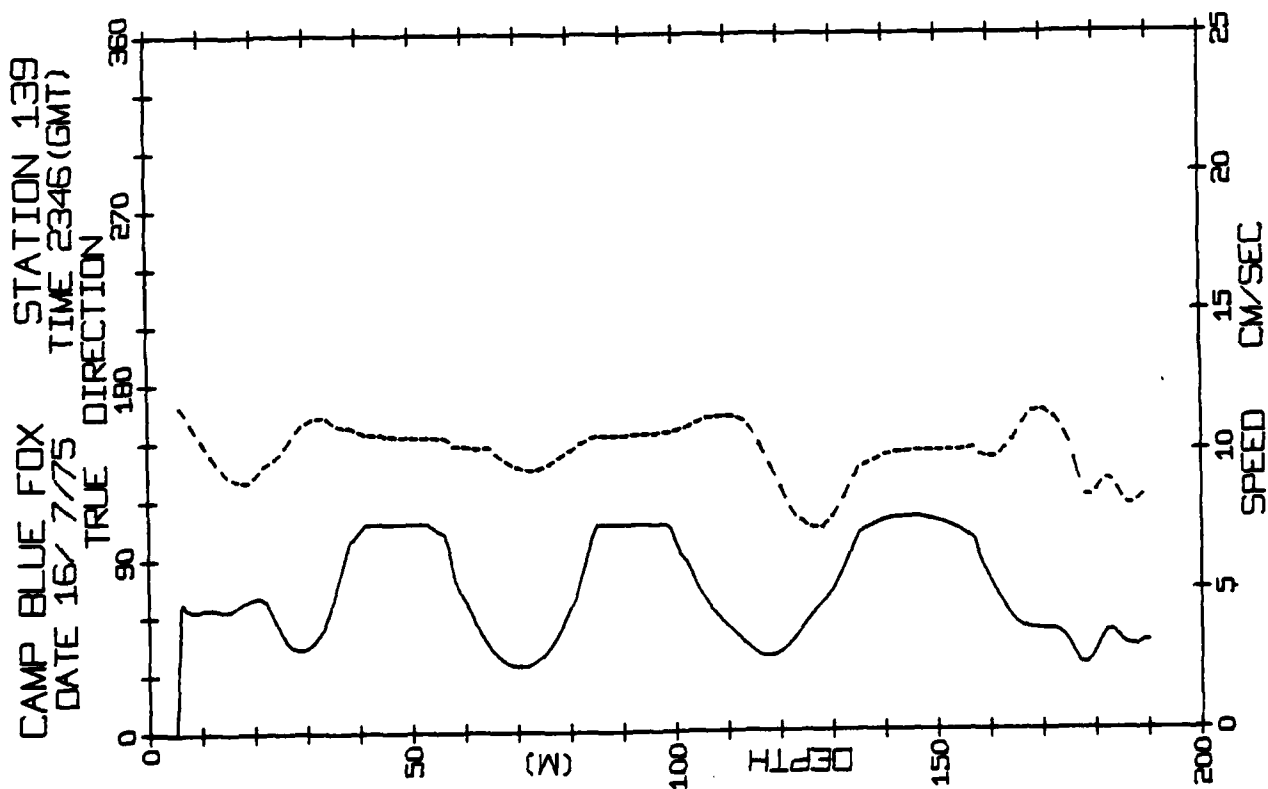
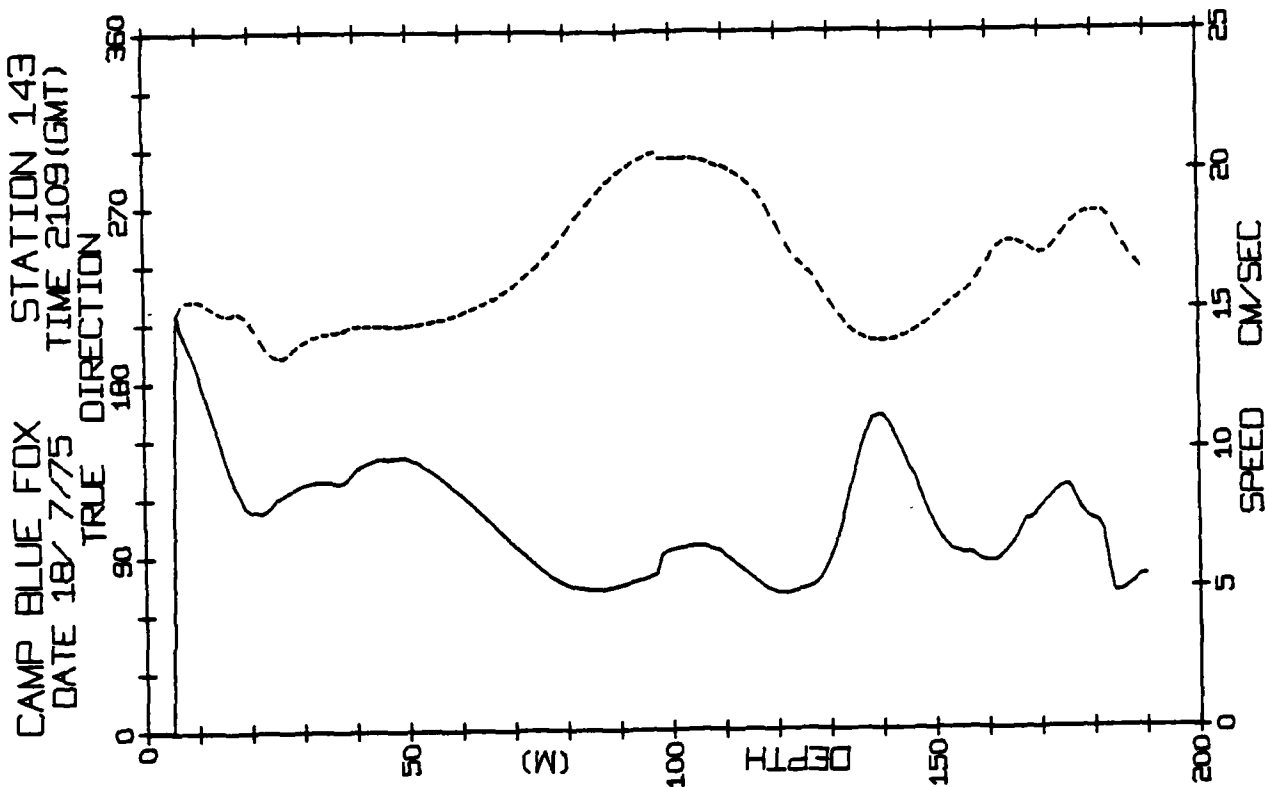
BLUE FOX STATION 135 (190M.) 14/JUL/75 2122 GMT
 LAT= 76.6216N LONG= 142.8025W LTER= 2. LOER= 4.
 NIVEL= -3.5 EIVEL= -0.1 NVER= 0. EVER= 0.

CAMP BLUE FOX STATION 137
DATE 15/ 7/75 TIME 2237 (GMT)

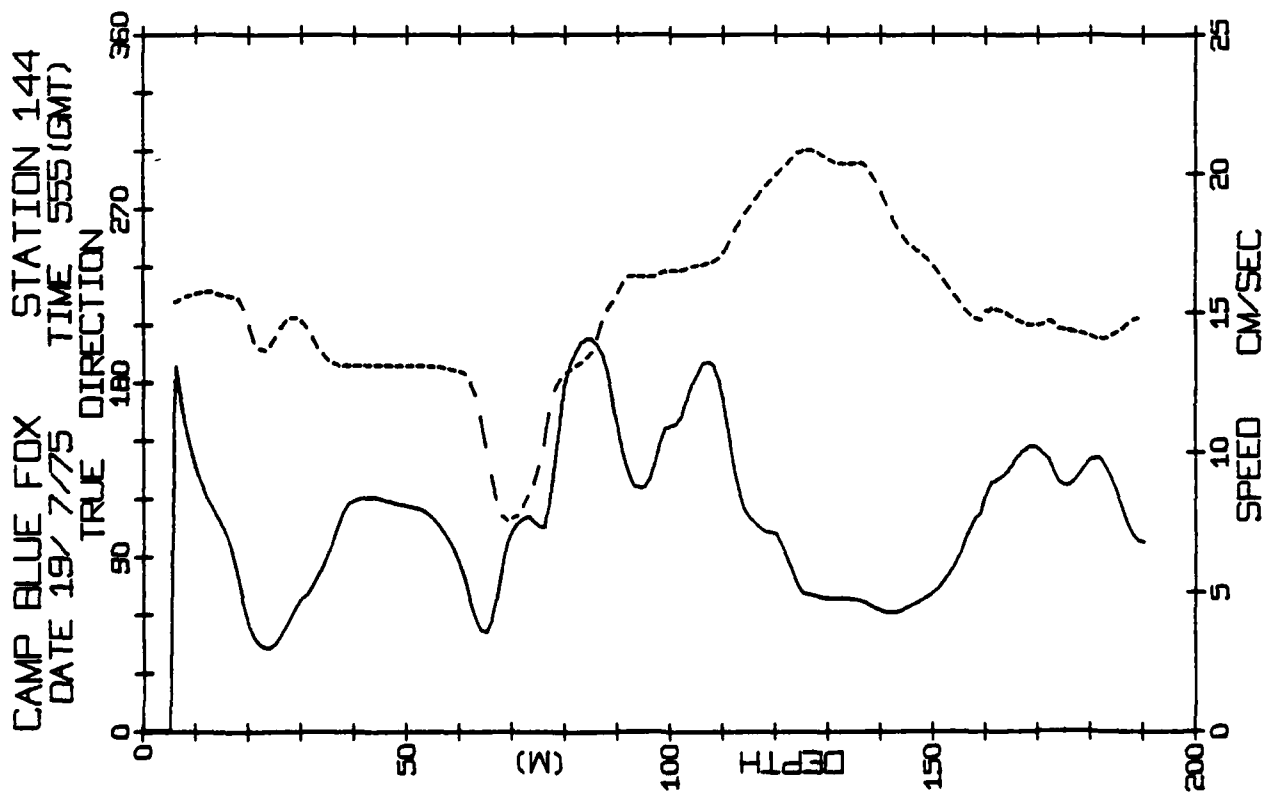
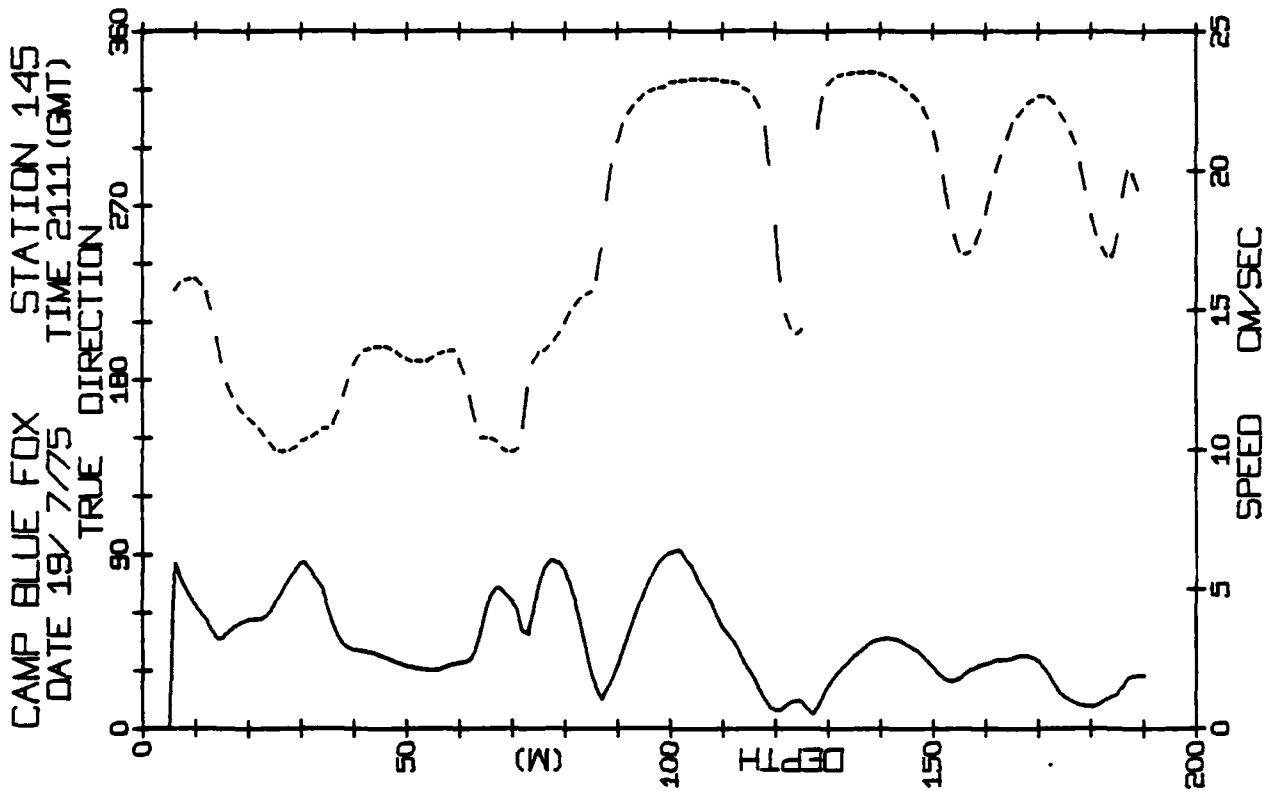


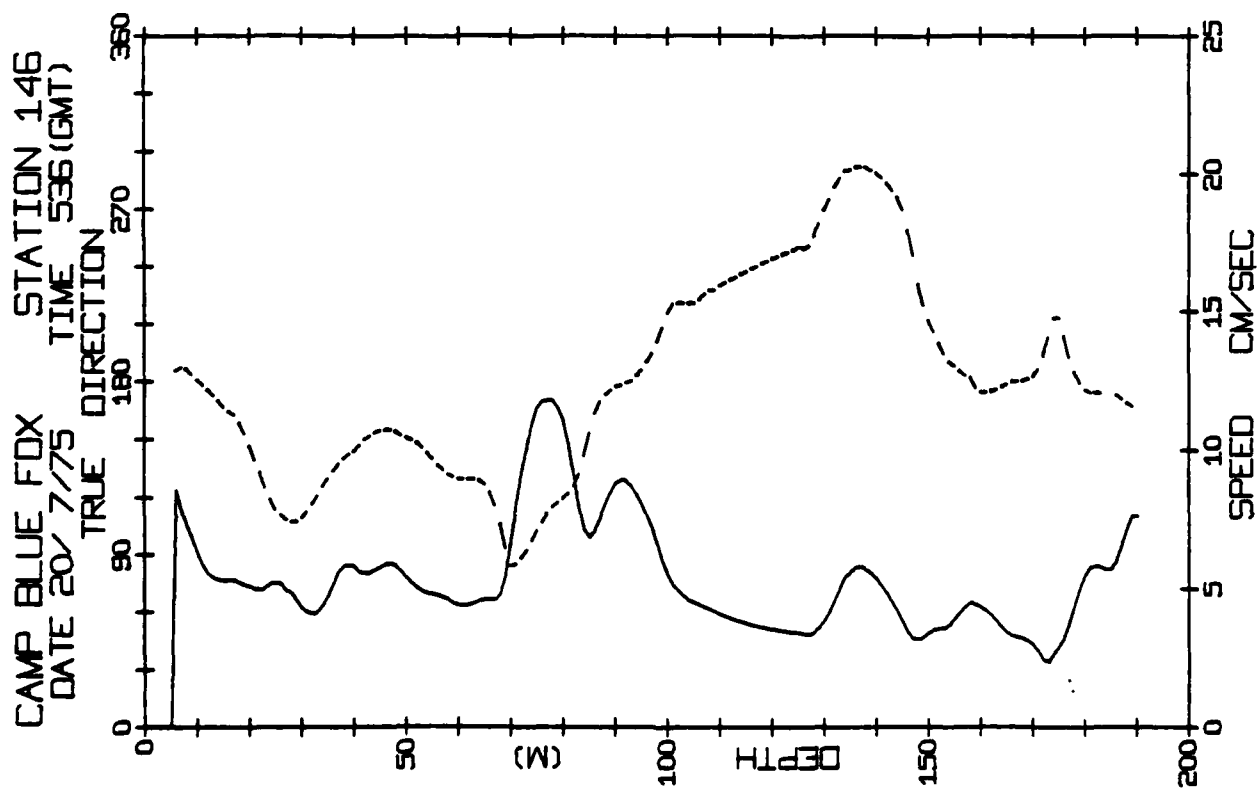
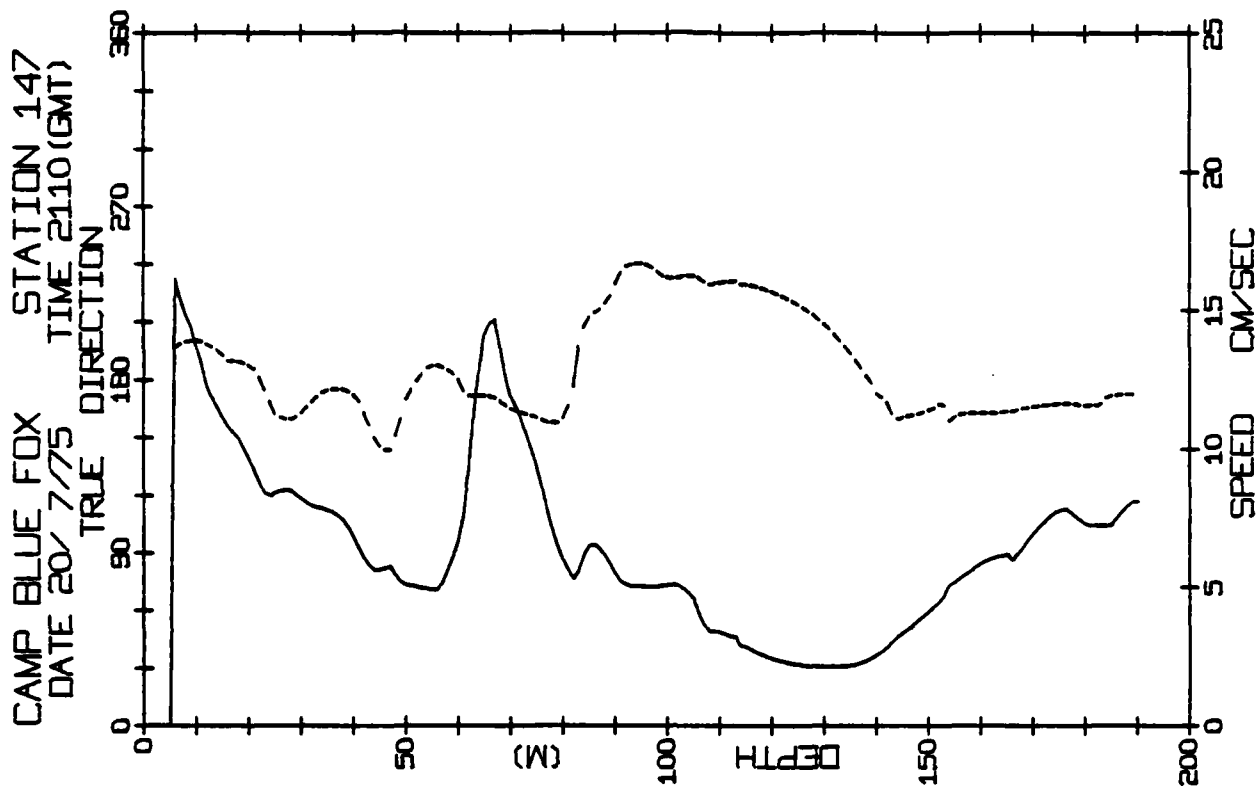
CAMP BLUE FOX STATION 138
DATE 16/ 7/75 TIME 537 (GMT)



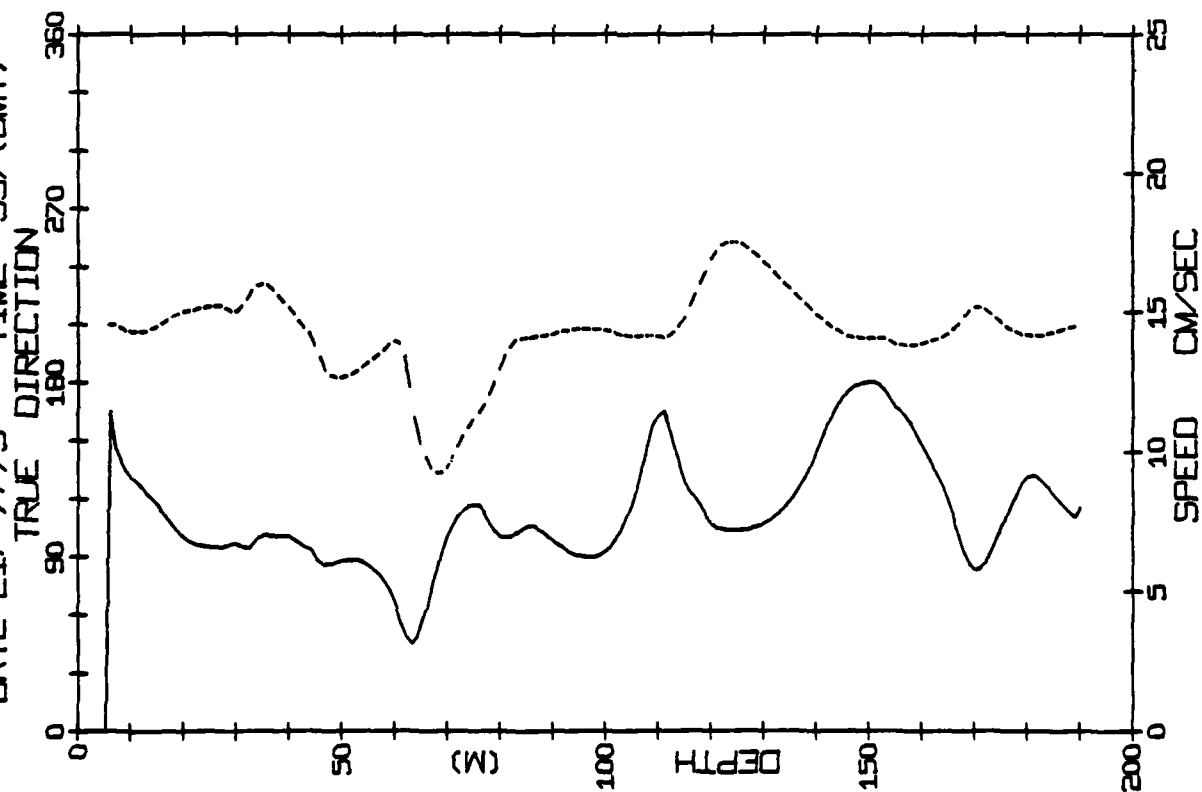


BLUE FOX STATION 139 (190M.) 16/JUL/75 2346 GMT
 LAT= 76.4534N LONG= 142.7489W LTER= 2. LOER= 4.
 NIVEL= -7.8 EIVEL= 3.7 NVER= 0. EVER= 0.

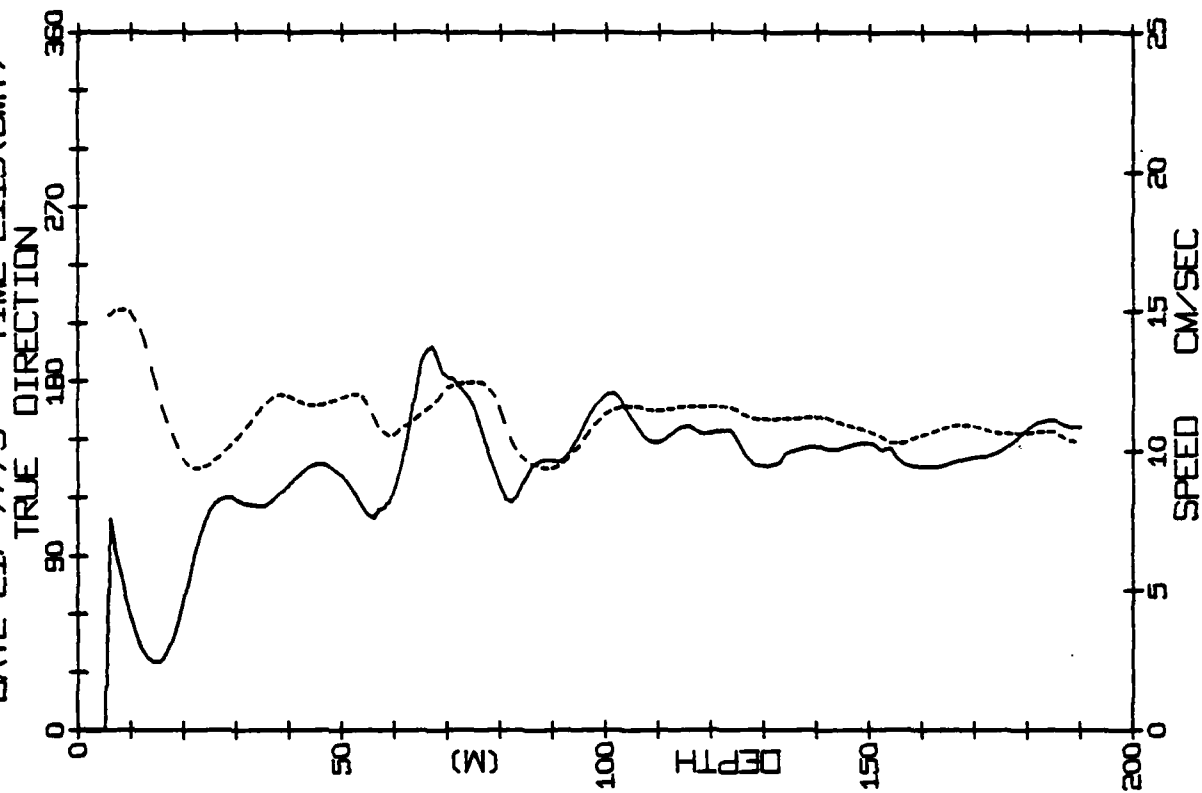




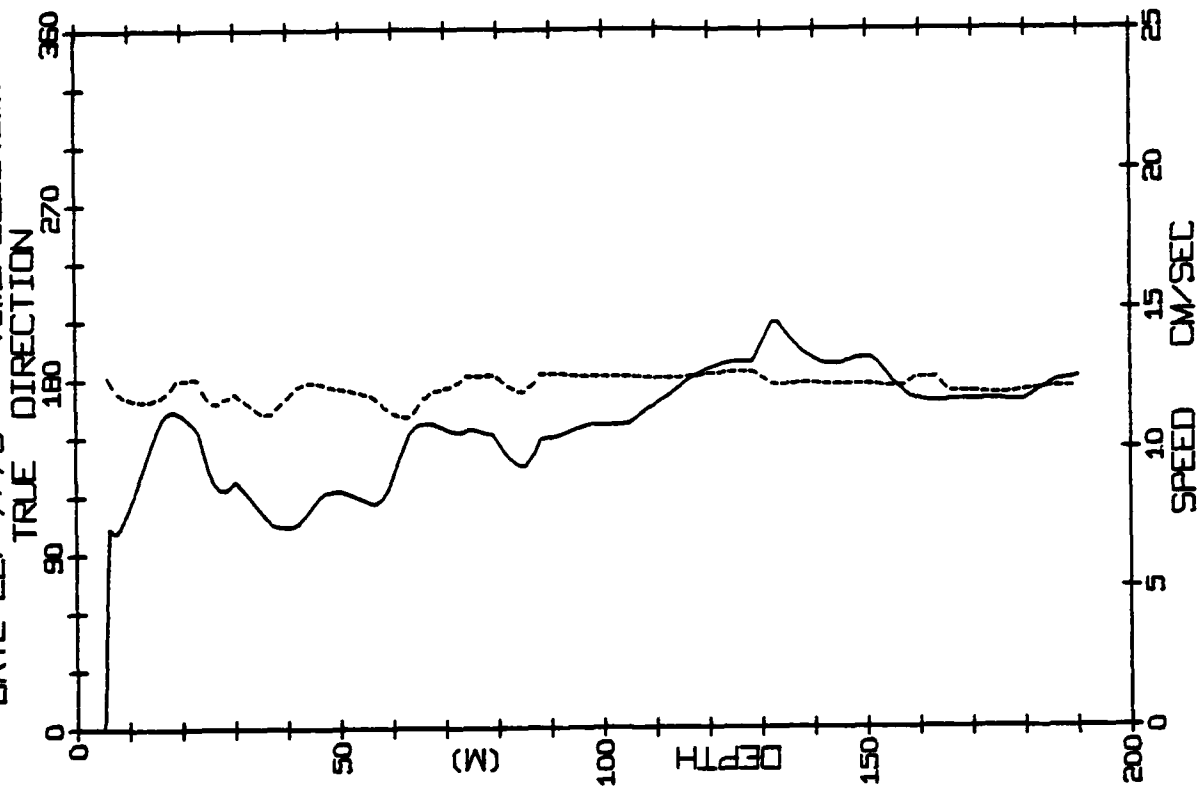
CAMP BLUE FOX STATION 148
DATE 21/ 7/75 TIME 537 (GMT)



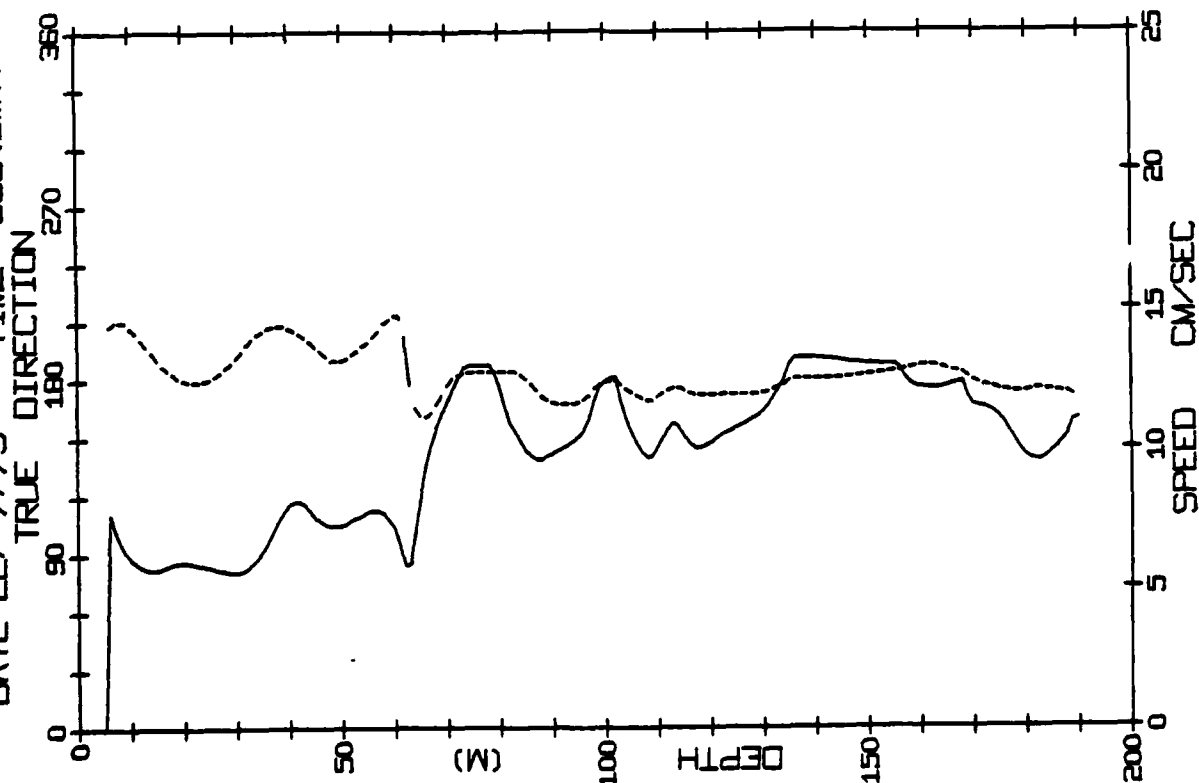
CAMP BLUE FOX STATION 149
DATE 21/ 7/75 TIME 2115 (GMT)



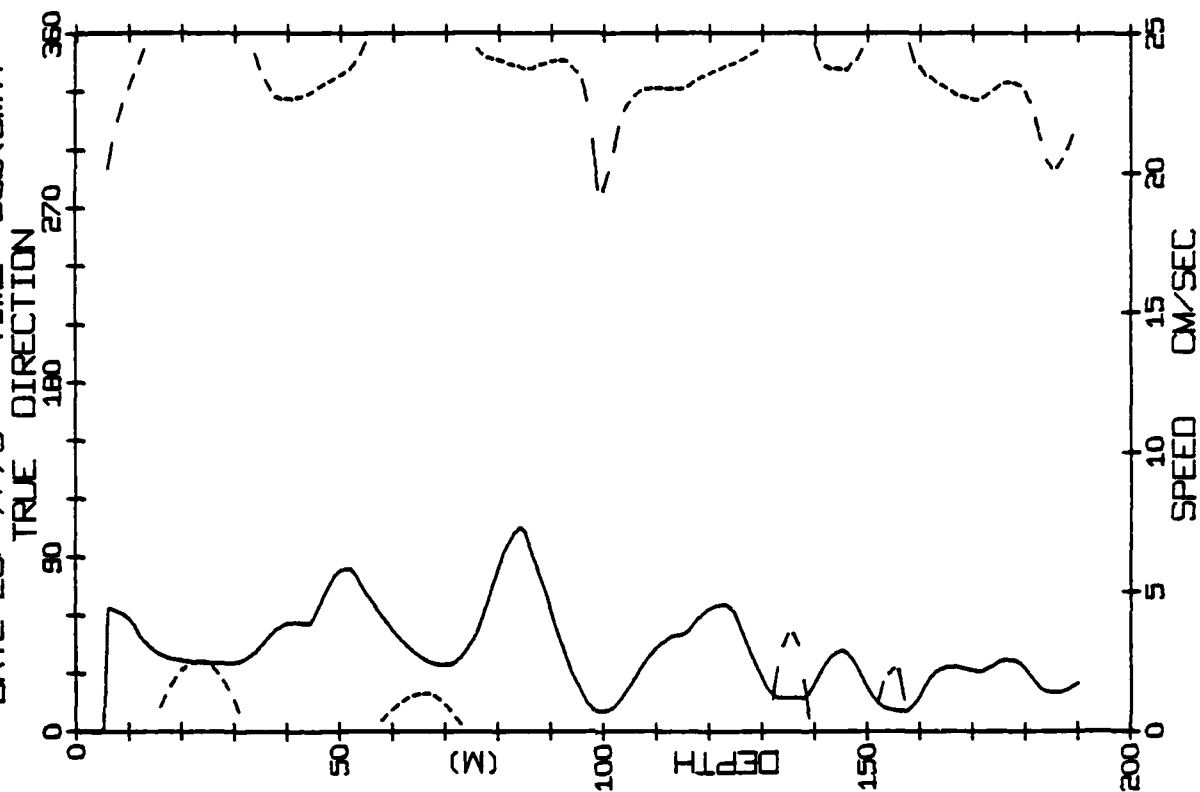
CAMP BLUE FOX STATION 151
DATE 22/7/75 TIME 2121 (GMT)



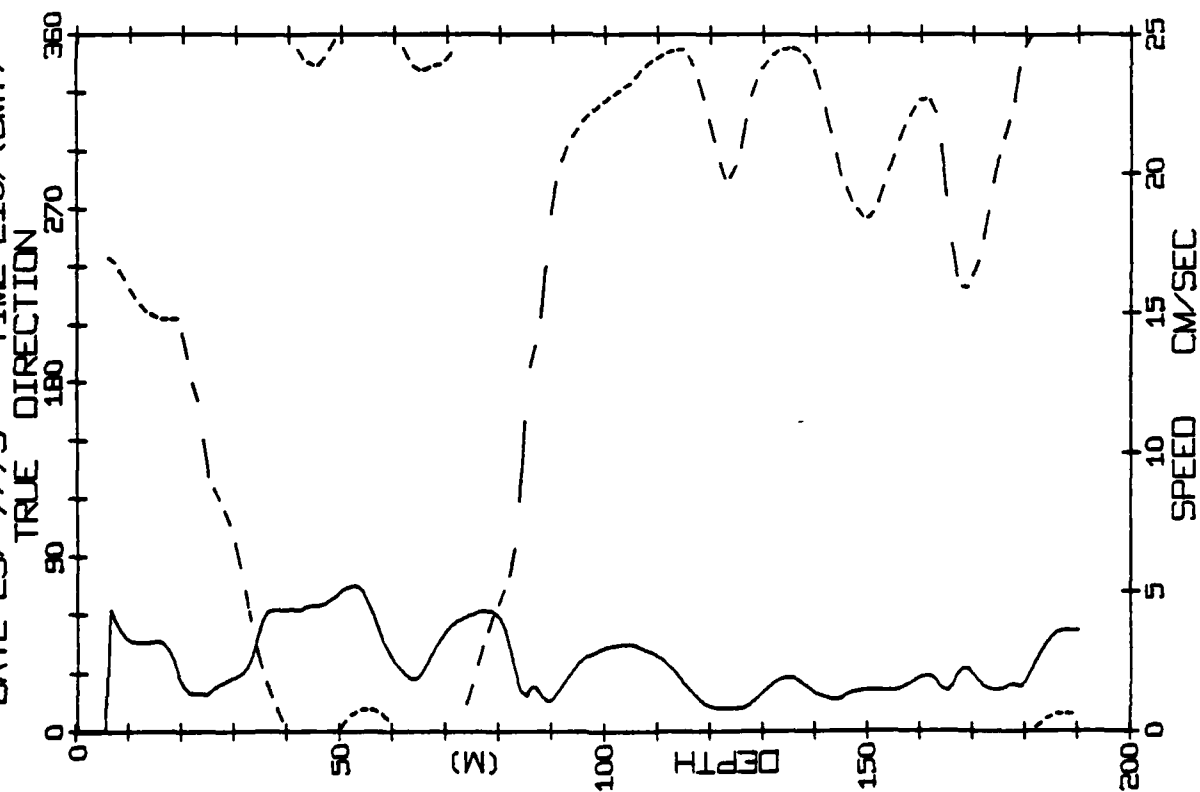
CAMP BLUE FOX STATION 150
DATE 22/7/75 TIME 536 (GMT)



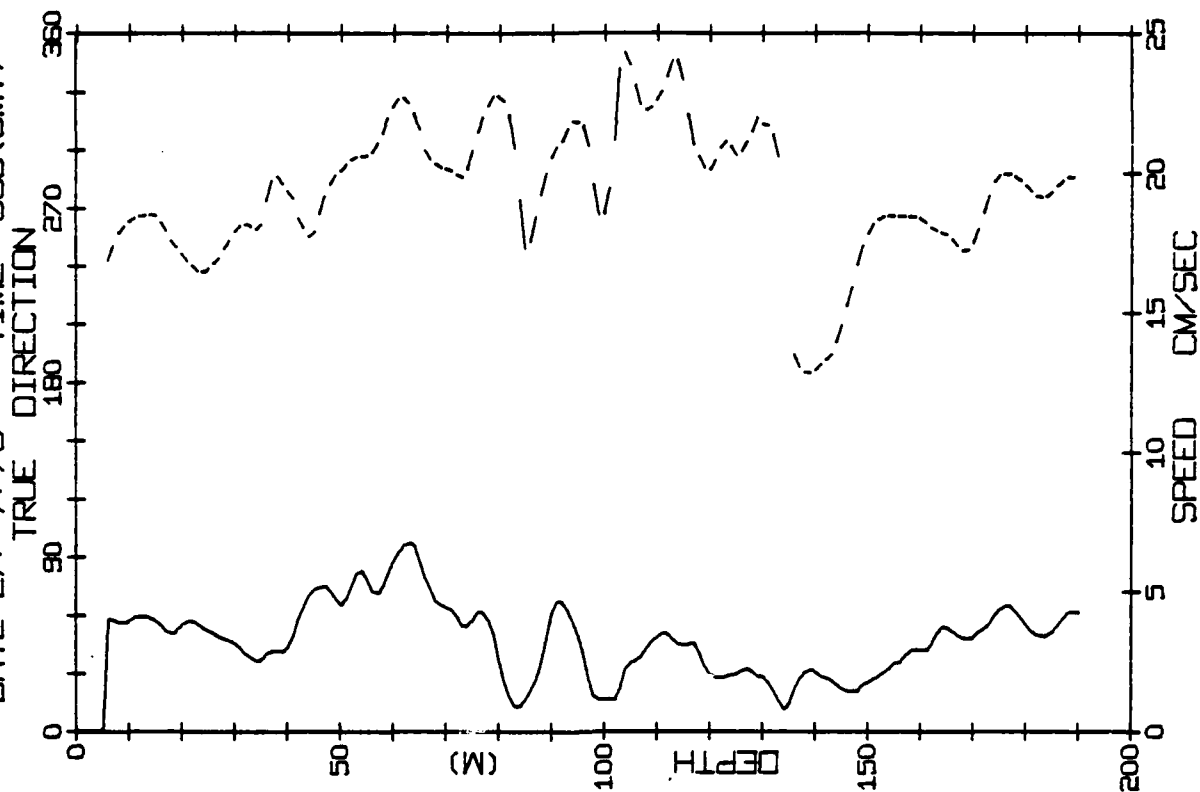
CAMP BLUE FOX STATION 158
DATE 26/7/75 TIME 536(GMT)



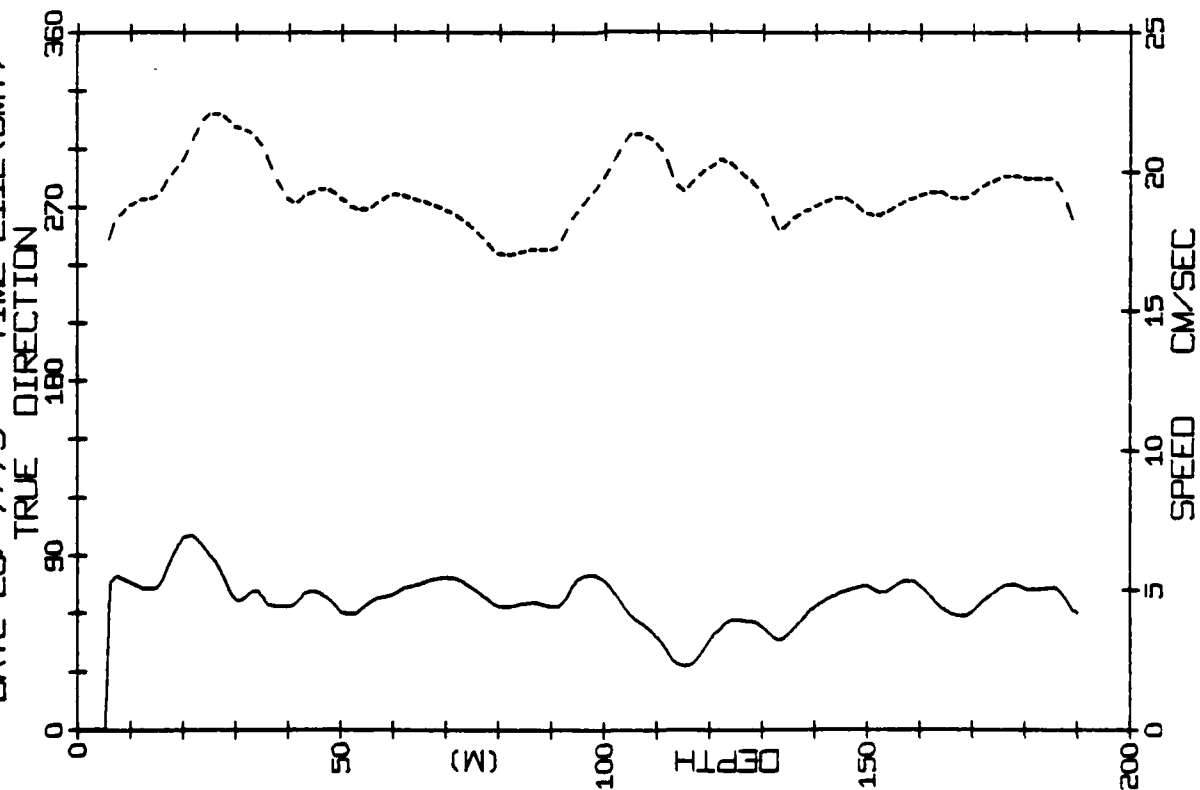
CAMP BLUE FOX STATION 157
DATE 25/7/75 TIME 2107(GMT)



CAMP BLUE FOX STATION 150
DATE 27/ 7/75 TIME 538(GMT)



CAMP BLUE FOX STATION 159
DATE 26/ 7/75 TIME 2112(GMT)



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LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

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ARCTIC ICE DYNAMICS JOINT EXPERIMENT 1975-1976, PHYSICAL OCEANO--ETC(U)

FEB 80 T O MANLEY, K HUNKINS, W TIEMANN

N00014-76-C-0004

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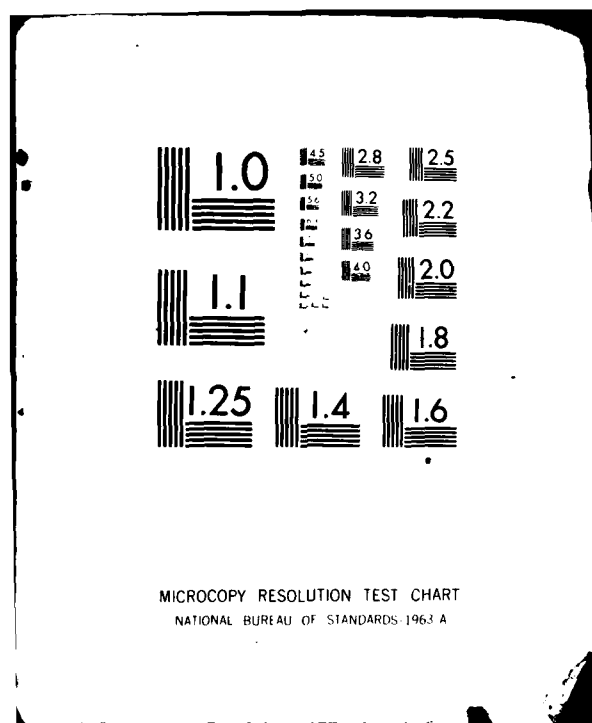
3 of 5

3 of 5

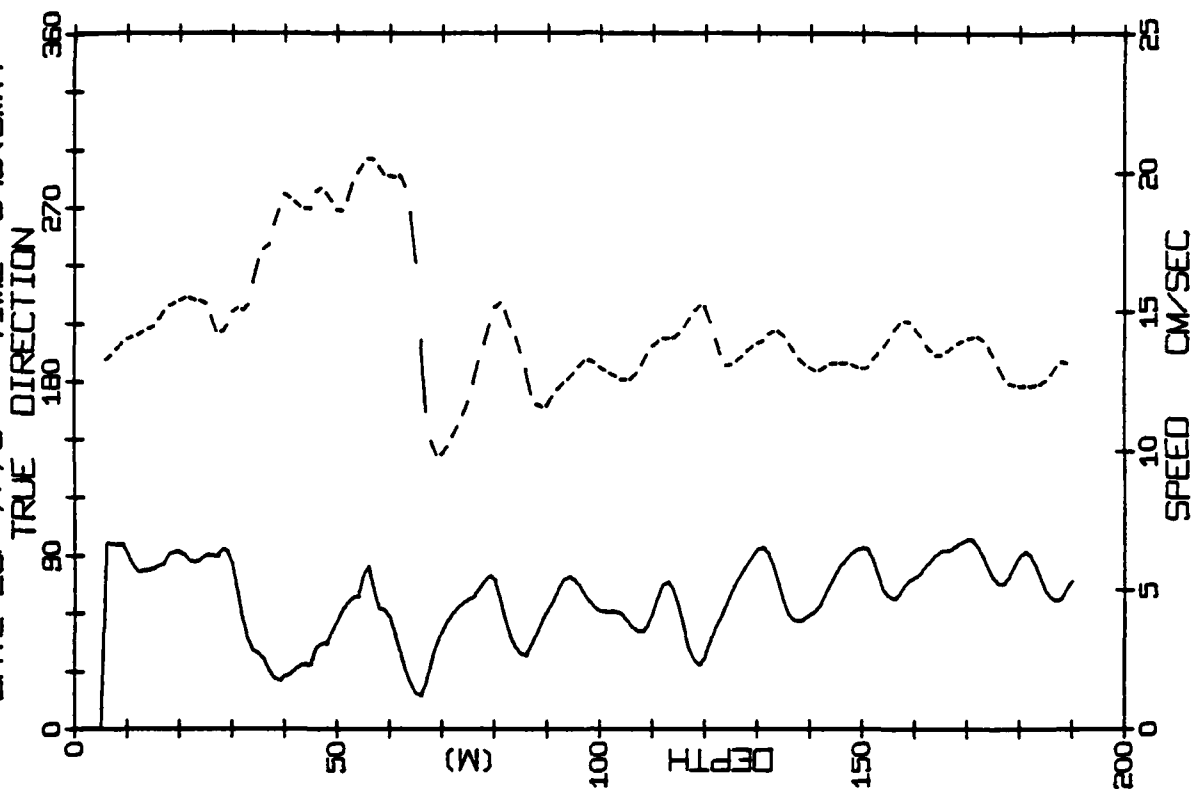
3 of 5

3 of 5

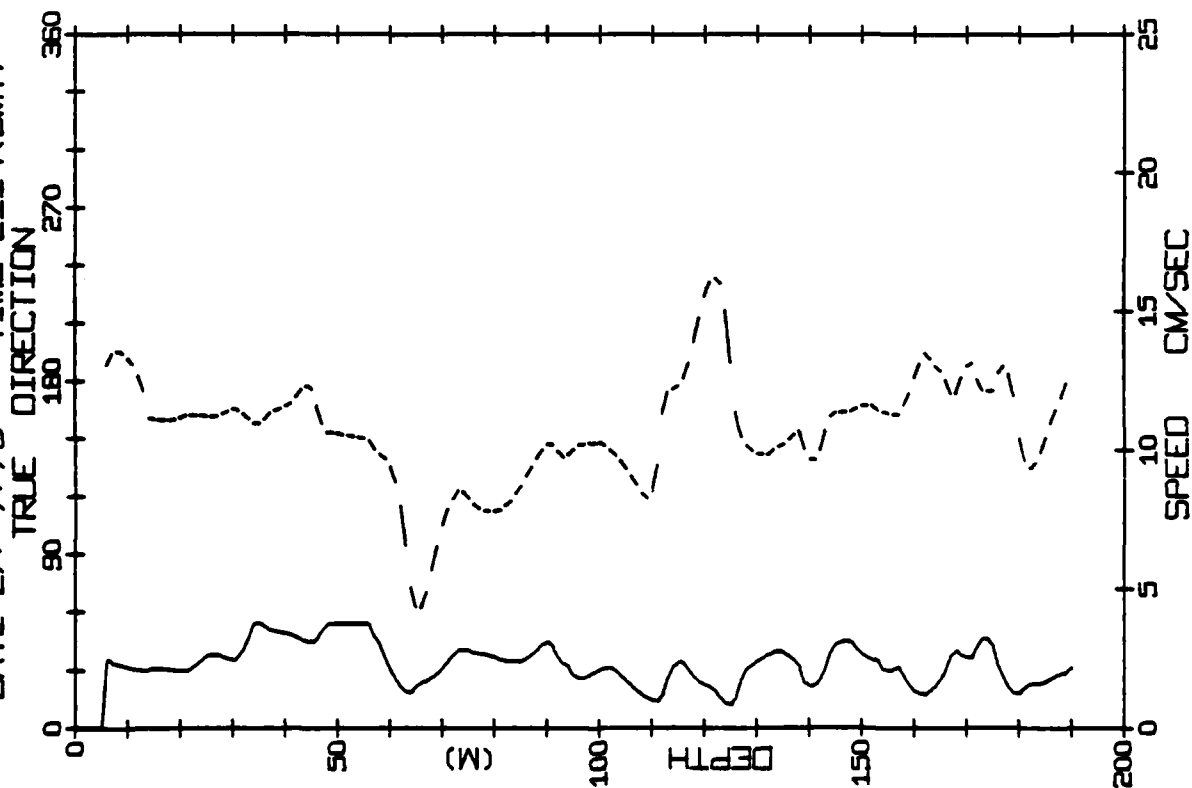
3 of 5



CAMP BLUE FOX STATION 162
DATE 28/7/75 TIME 545 (GMT)

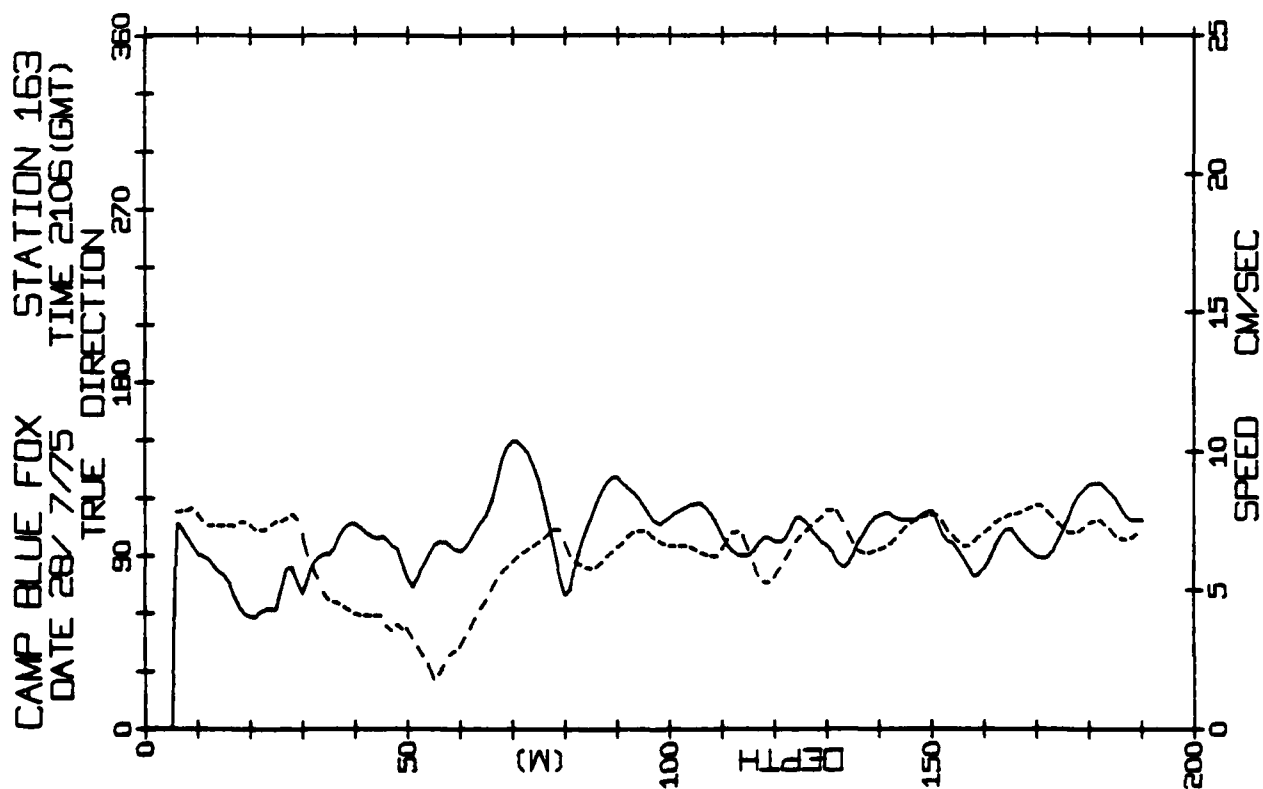
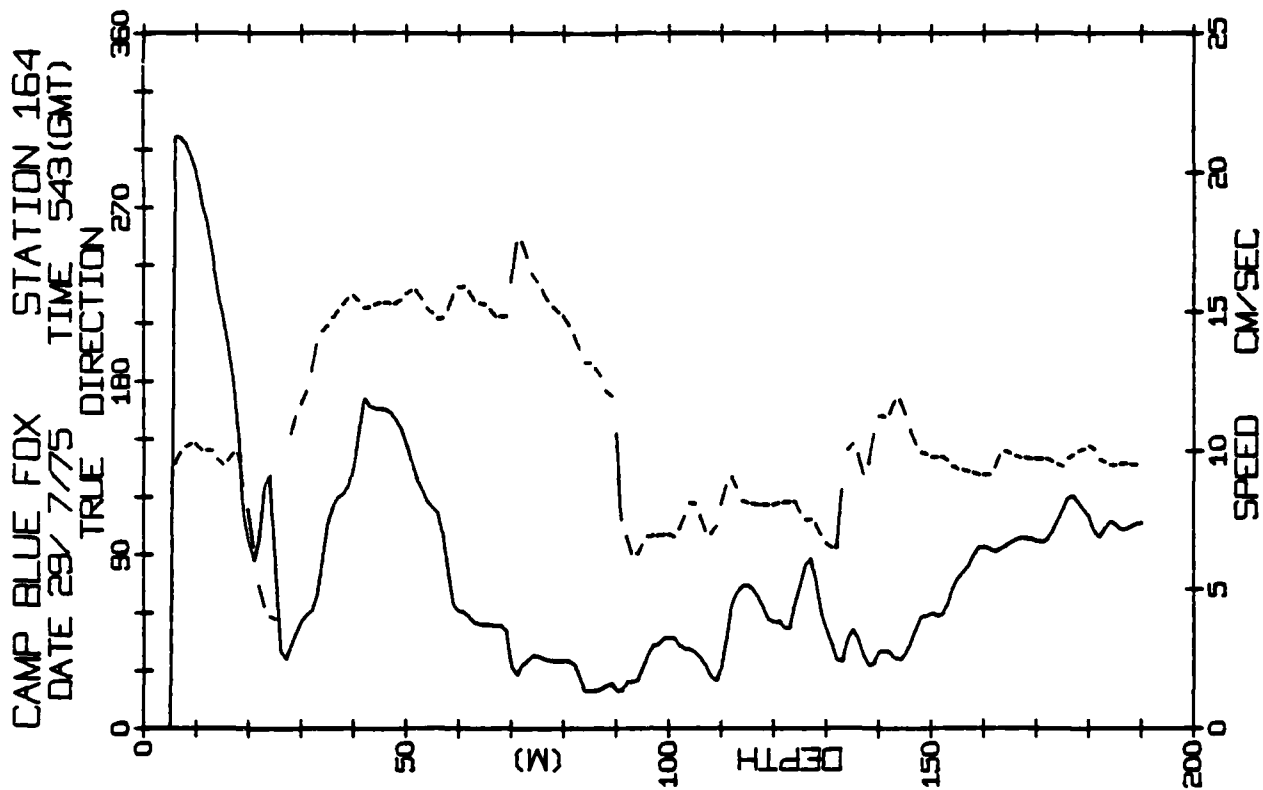


CAMP BLUE FOX STATION 161
DATE 27/7/75 TIME 2114 (GMT)



BLUE FOX STATION 162 (190M.)
LAT= 75.6261N LONG= 142.8905W
NIVEL= -4.8 EIVEL= -3.6

BLUE FOX STATION 161 (190M.)
LAT= 75.6388N LONG= 142.9235W
NIVEL= -4.4 EIVEL= 2.3

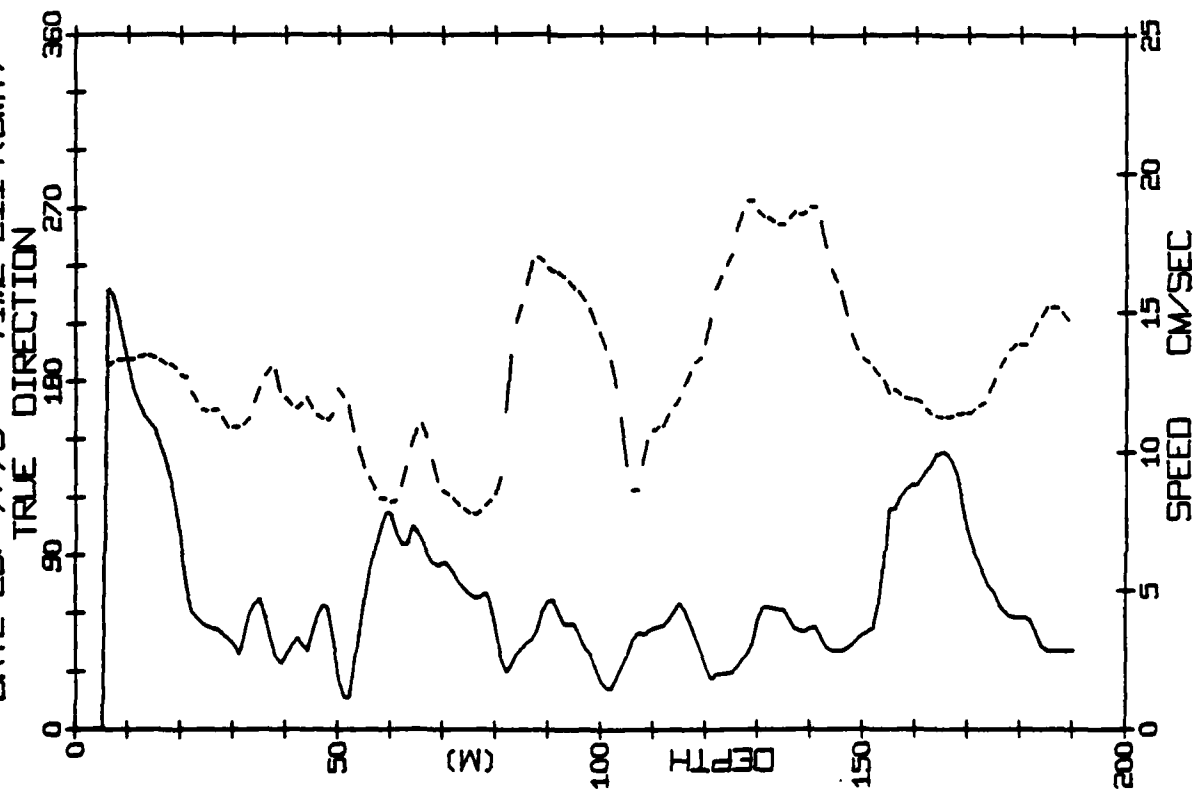


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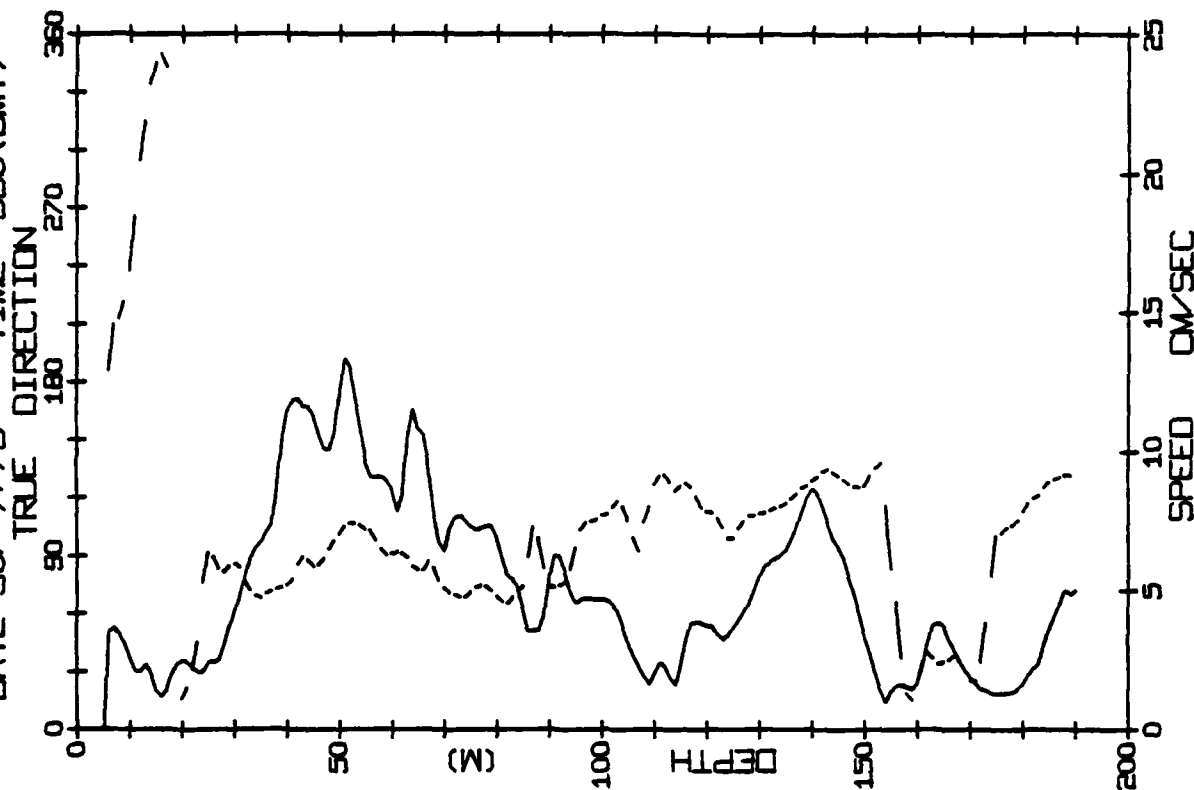
BLUE FOX STATION 163      (190M.)      28/JUL/75      2106 GMT
LAT= 75.6026N      LONG= 142.8150W      LTER= 0.      LOER= 1.
NIVEL= -1.3      EIVEL= 11.8      NVER= 0.      EVER= 0.

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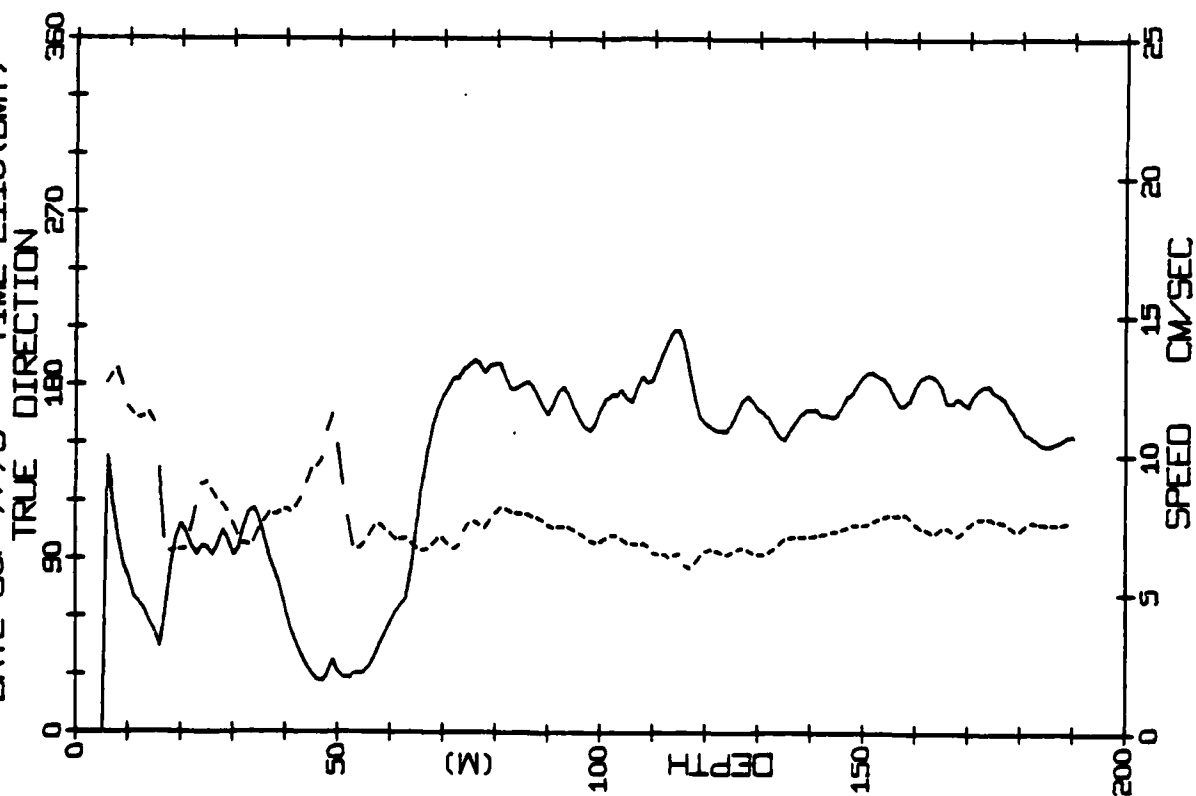
CAMP BLUE FOX STATION 165
DATE 29/7/75 TIME 2114(GMT)



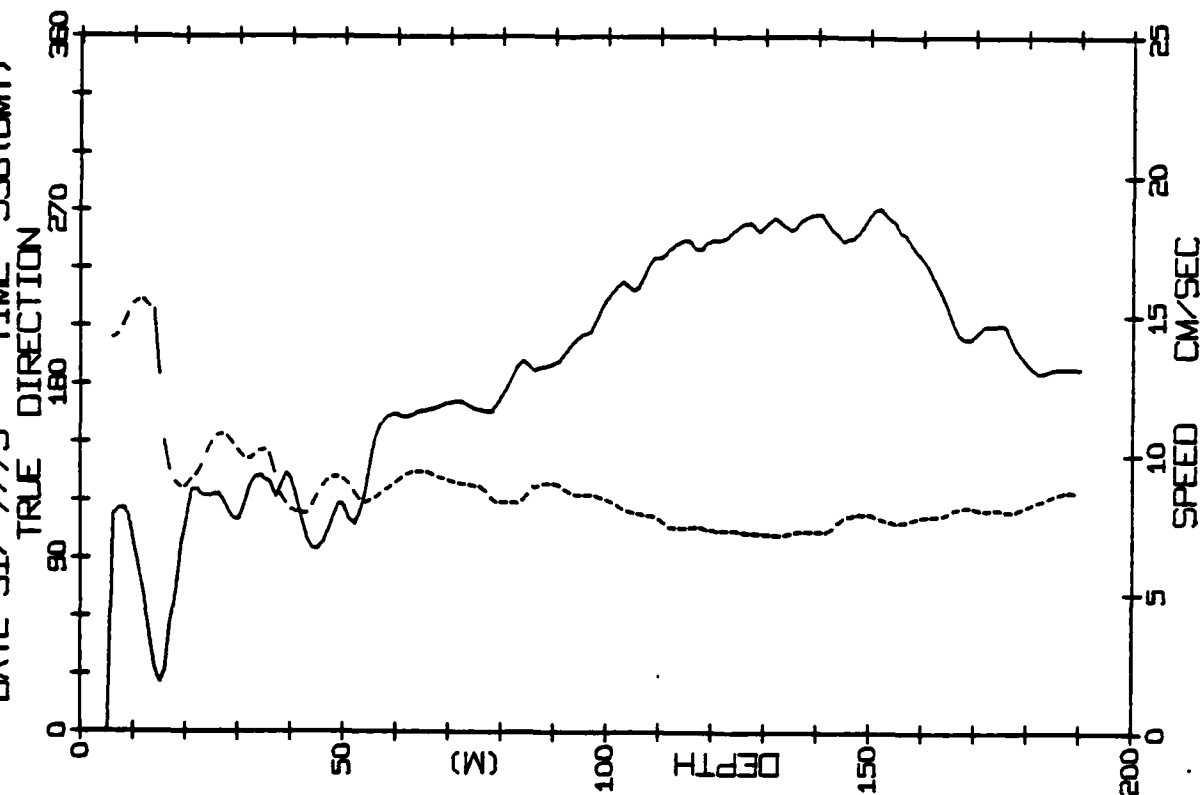
CAMP BLUE FOX STATION 166
DATE 30/7/75 TIME 550(GMT)



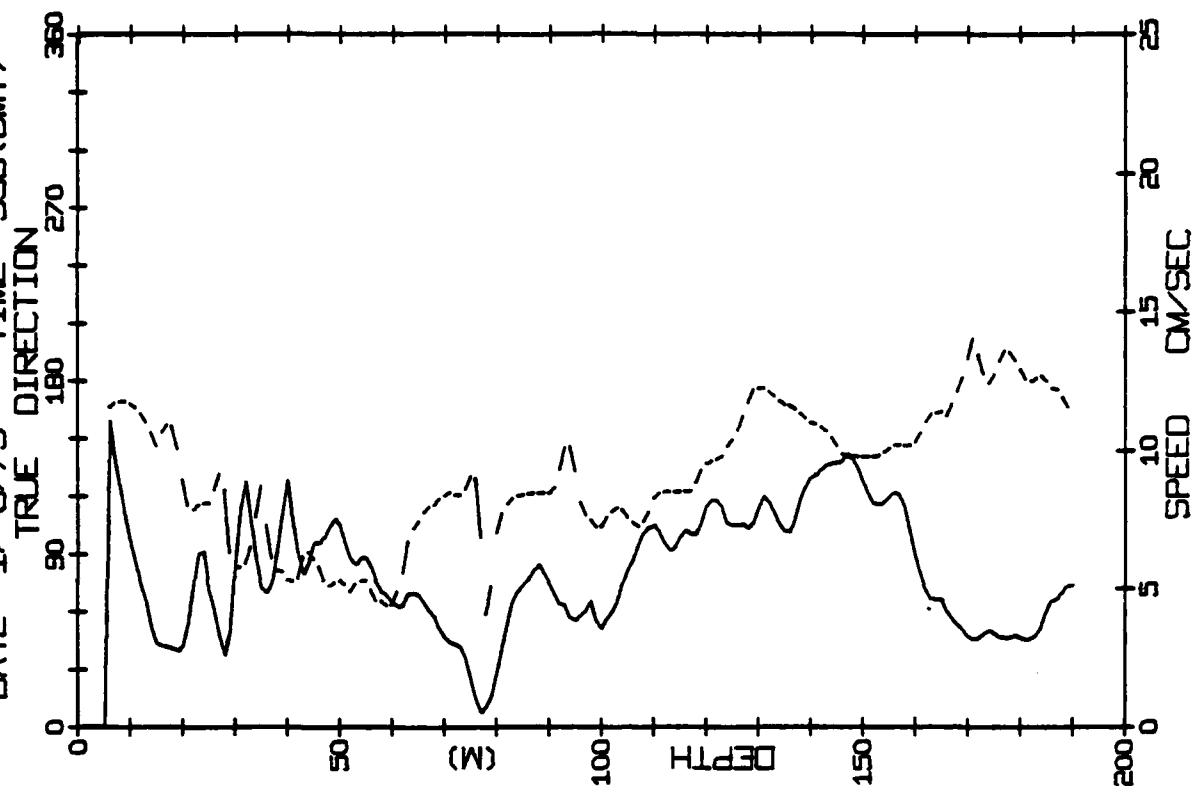
CAMP BLUE FOX STATION 167
DATE 30/7/75 TIME 2110 (GMT)



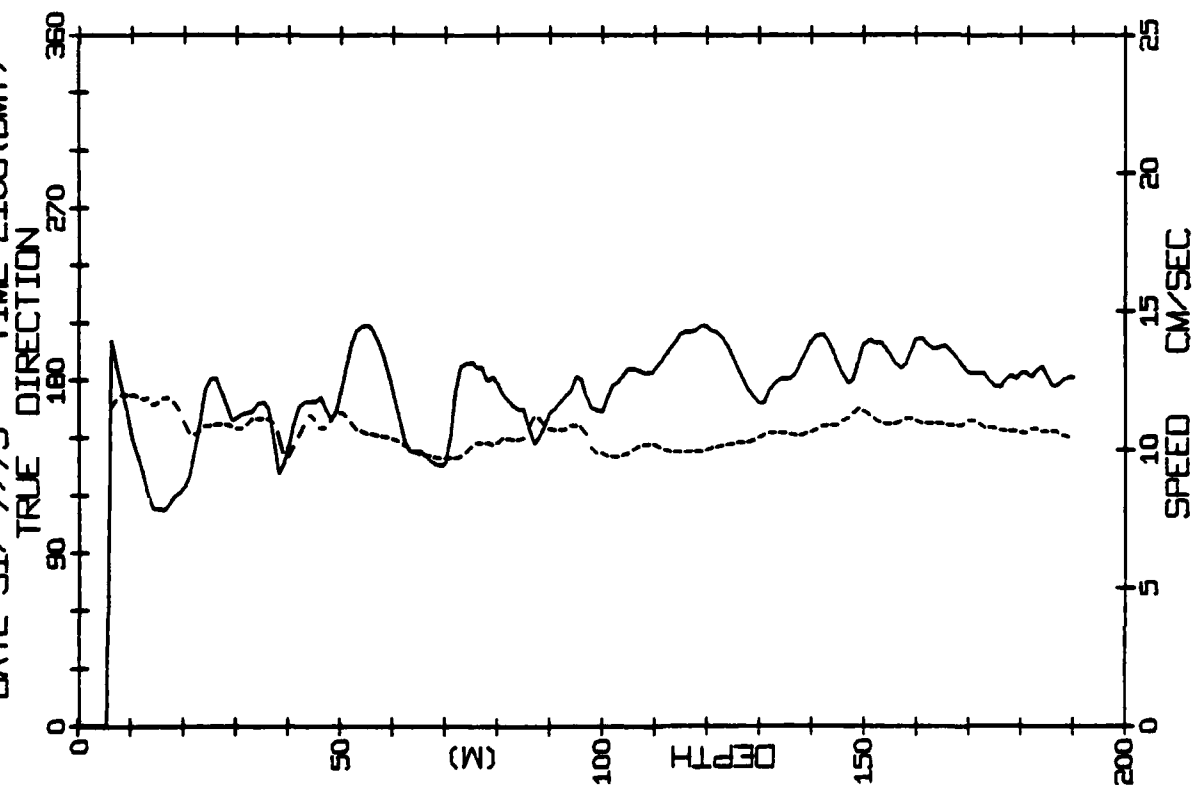
CAMP BLUE FOX STATION 168
DATE 31/7/75 TIME 536 (GMT)

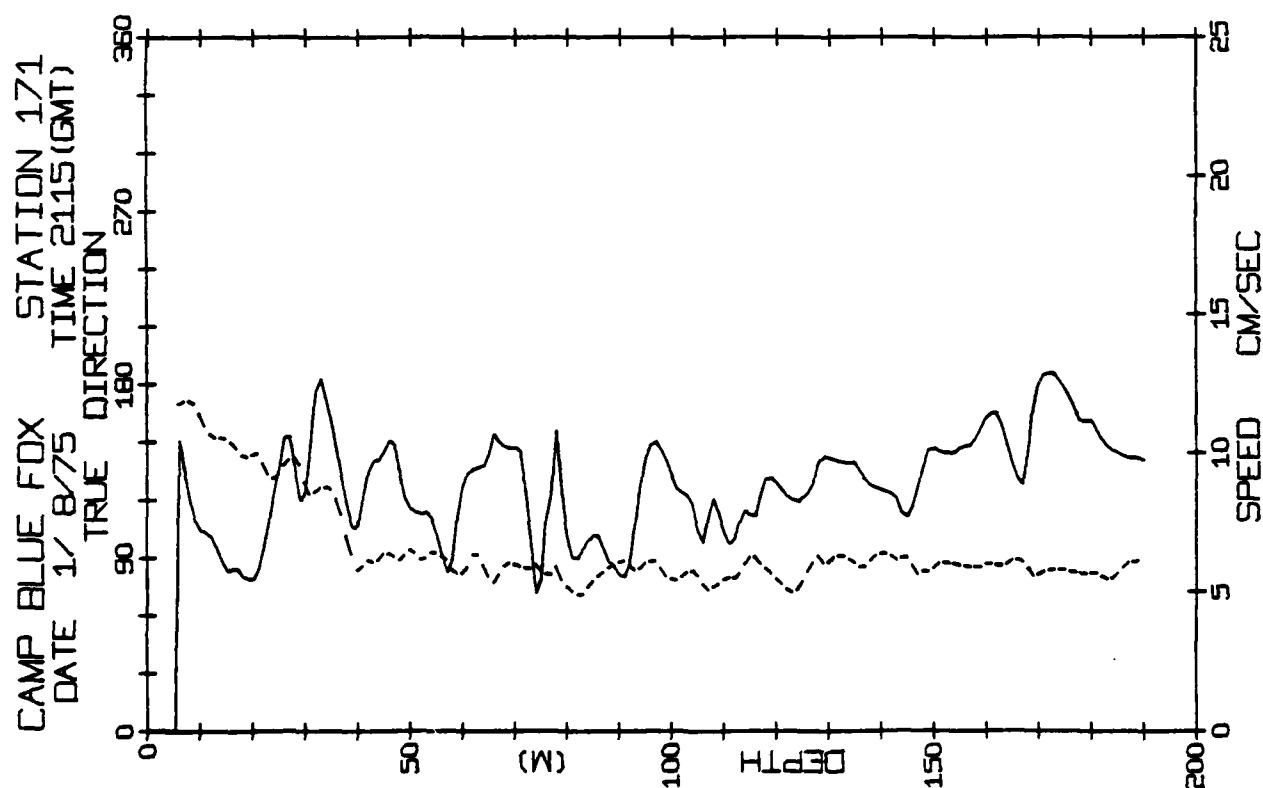
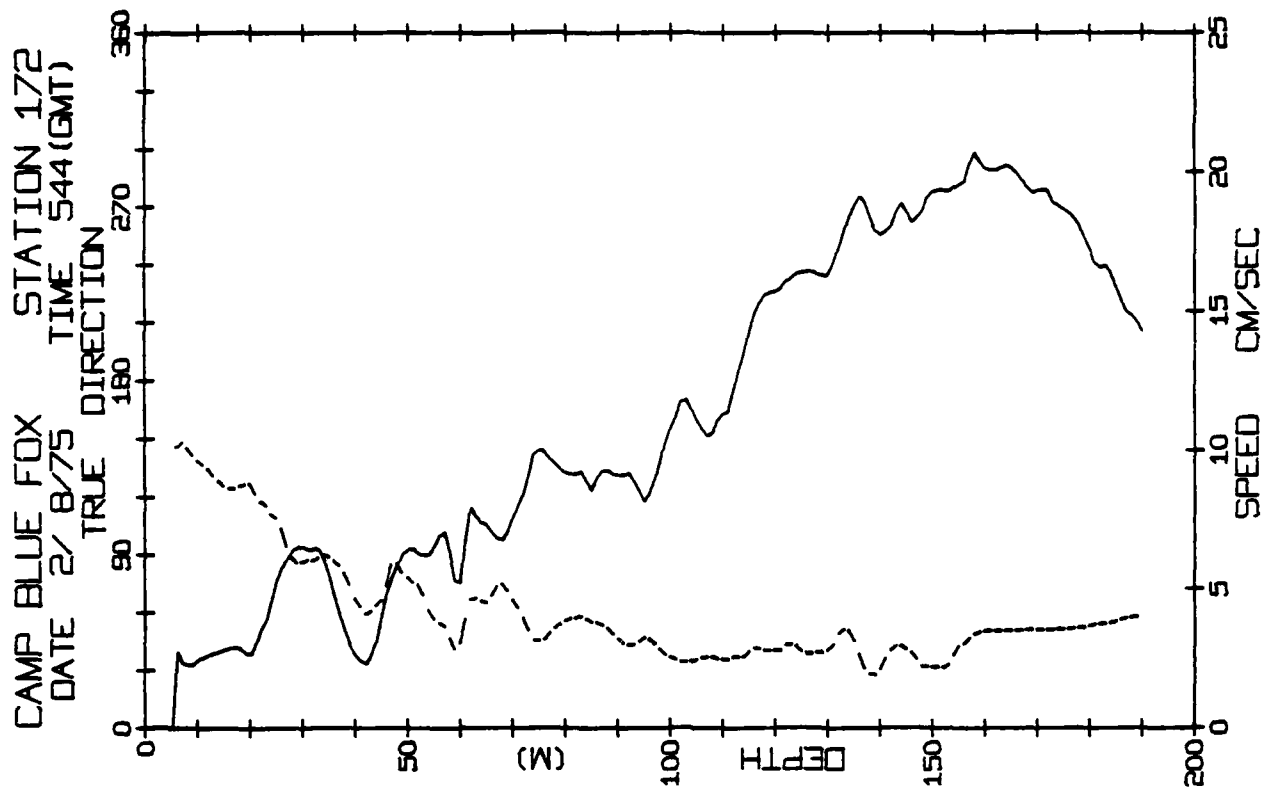


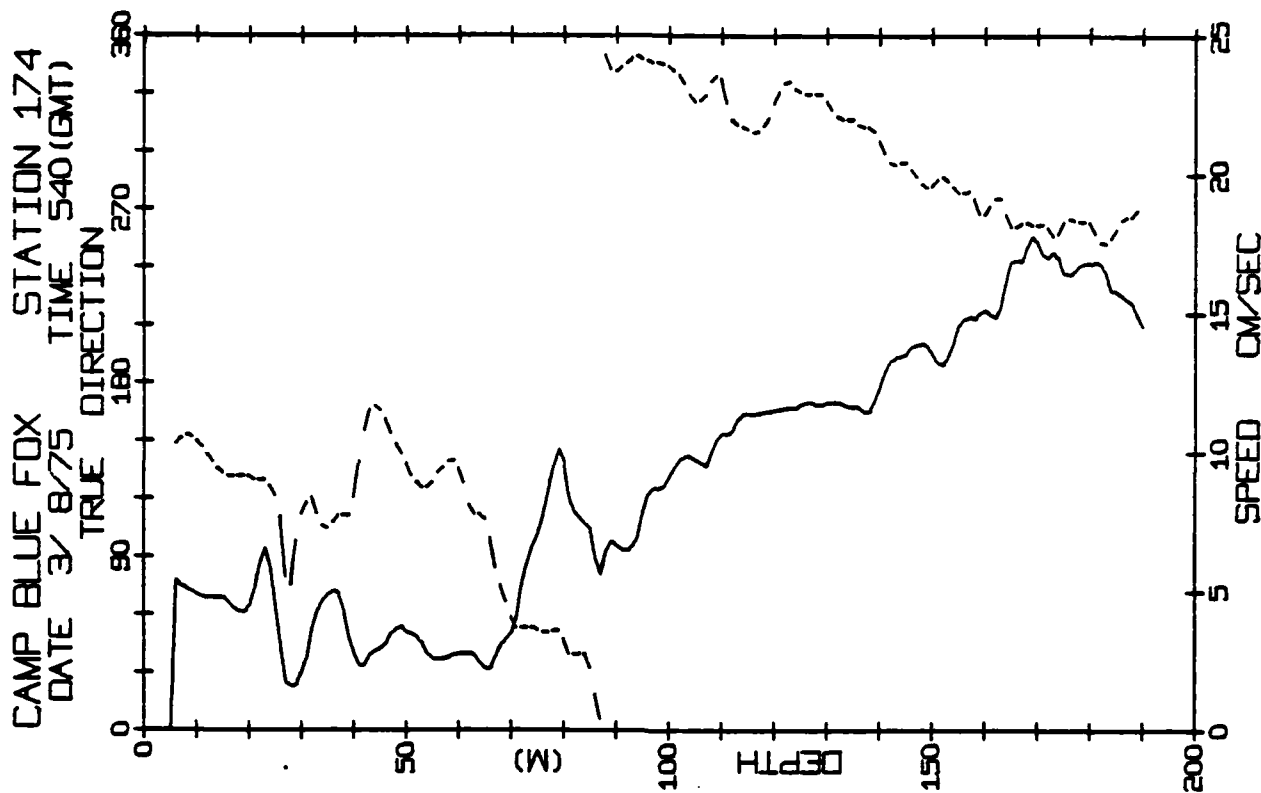
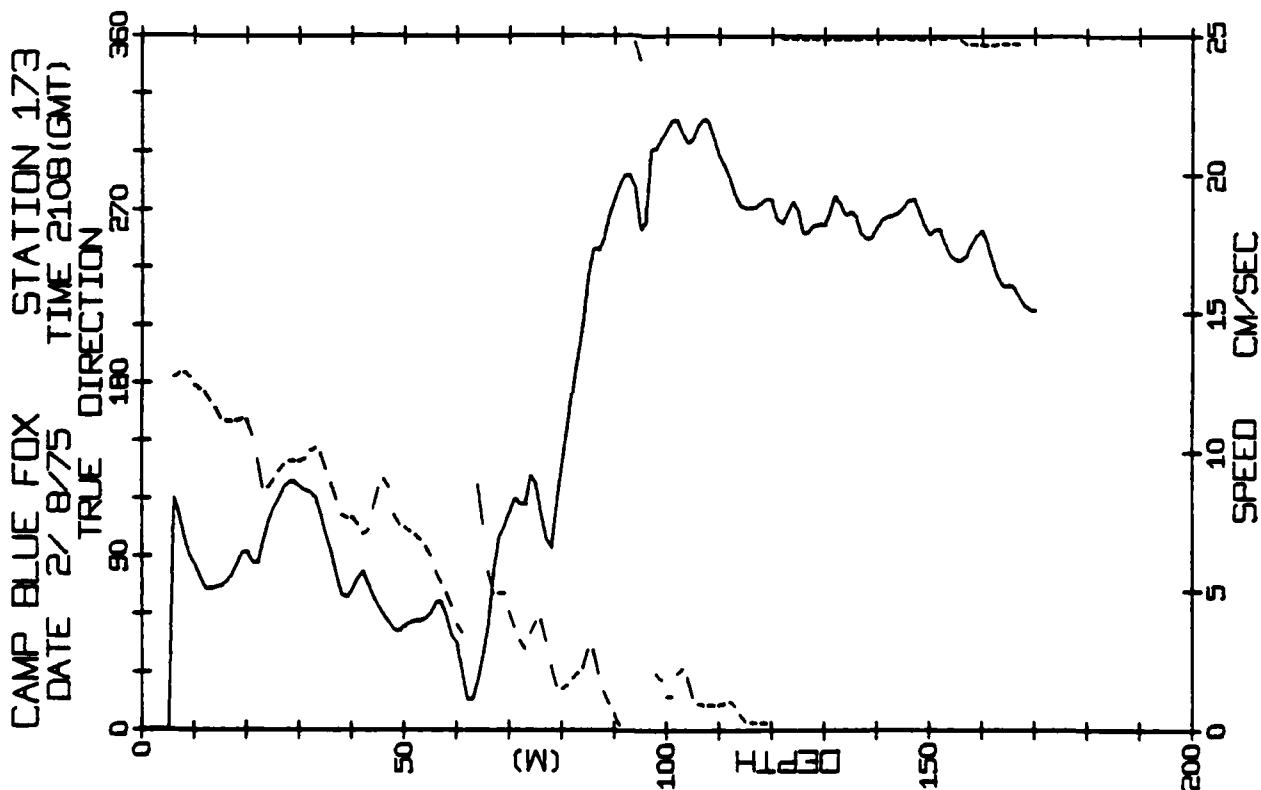
CAMP BLUE FOX STATION 170
DATE 1/ 8/75 TIME 538(GMT)



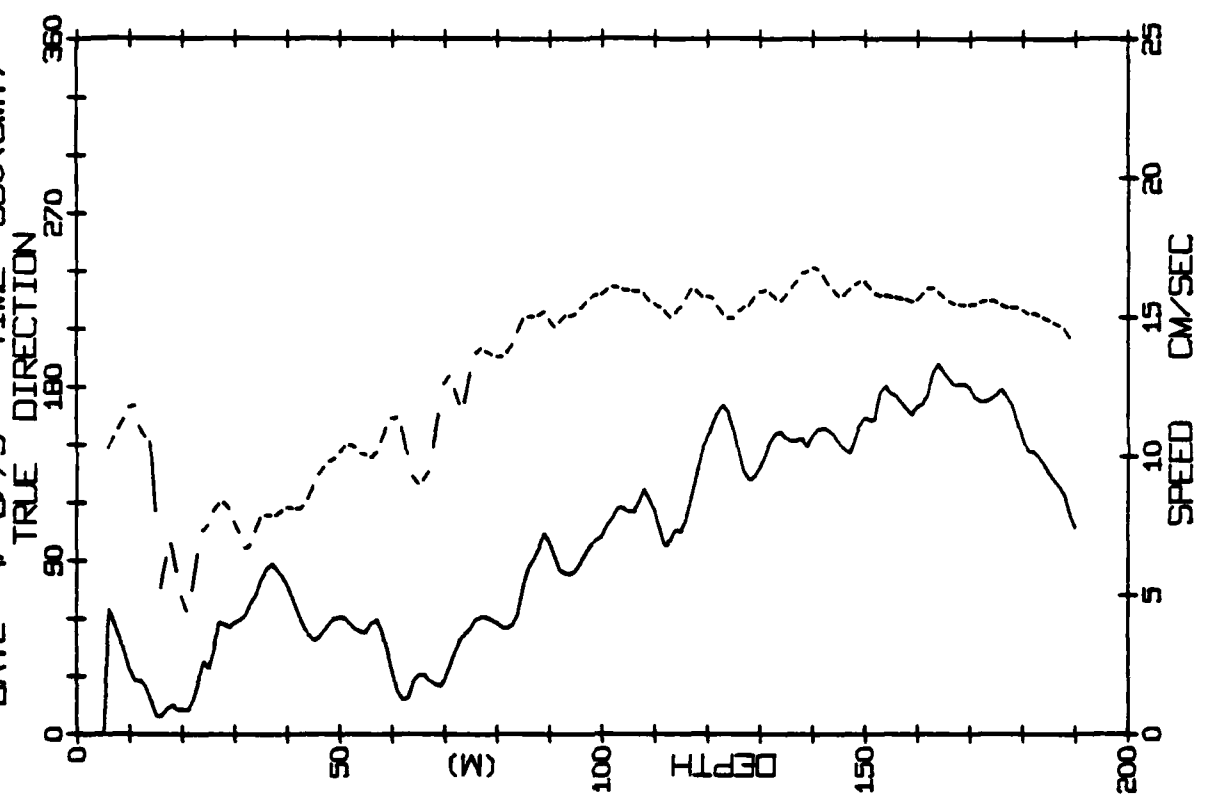
CAMP BLUE FOX STATION 169
DATE 31/ 7/75 TIME 2106(GMT)



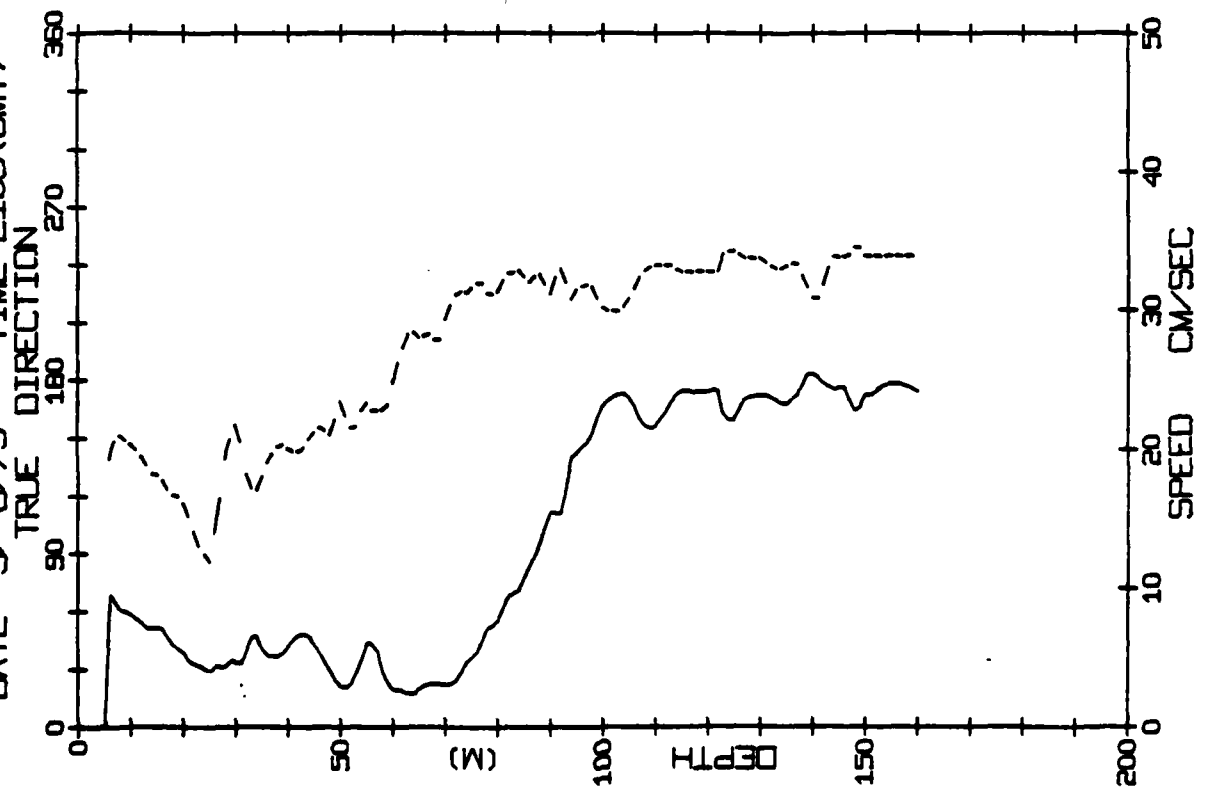




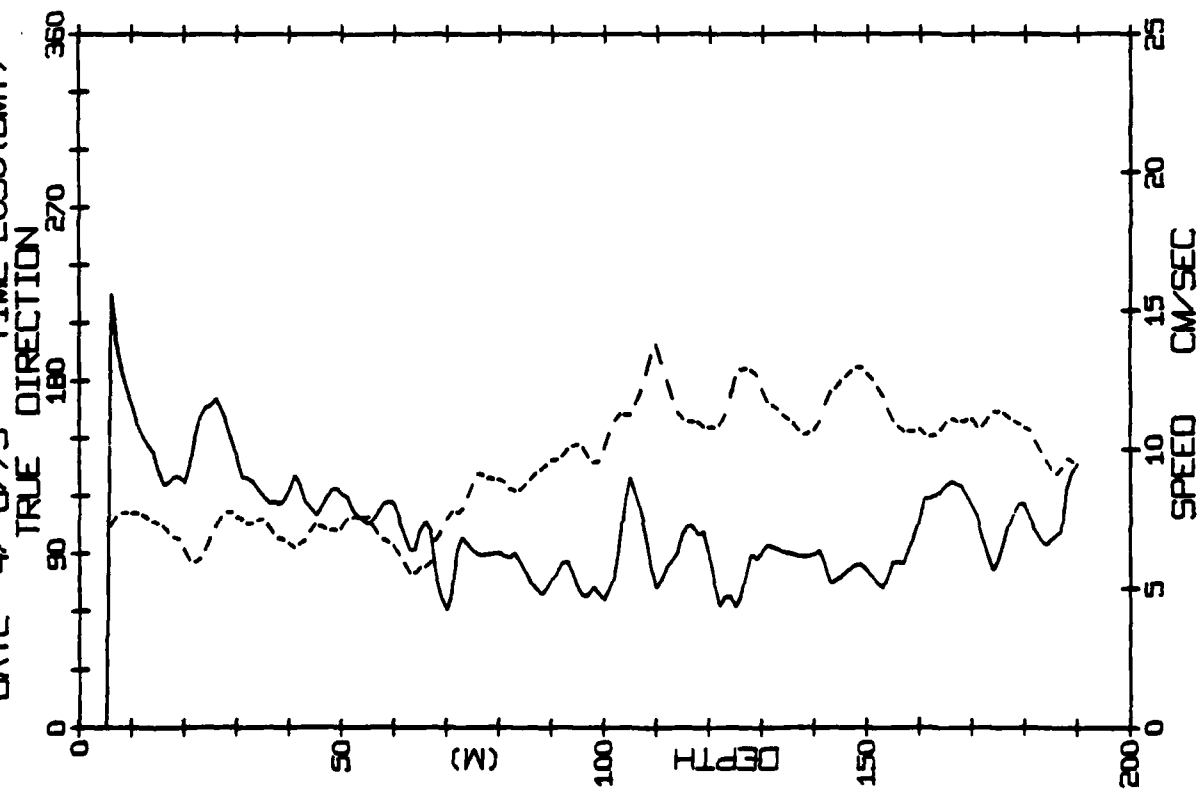
CAMP BLUE FOX STATION 176
DATE 4/8/75 TIME 550 (GMT)



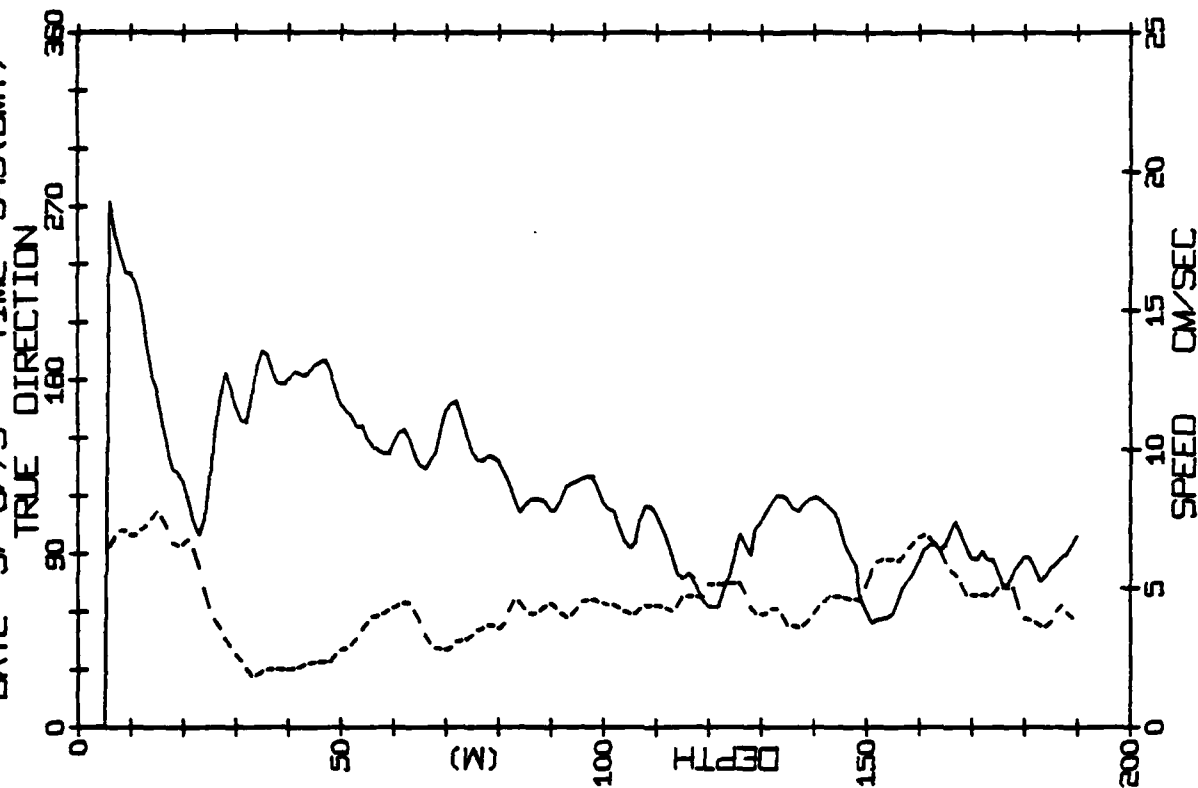
CAMP BLUE FOX STATION 175
DATE 3/8/75 TIME 2109 (GMT)



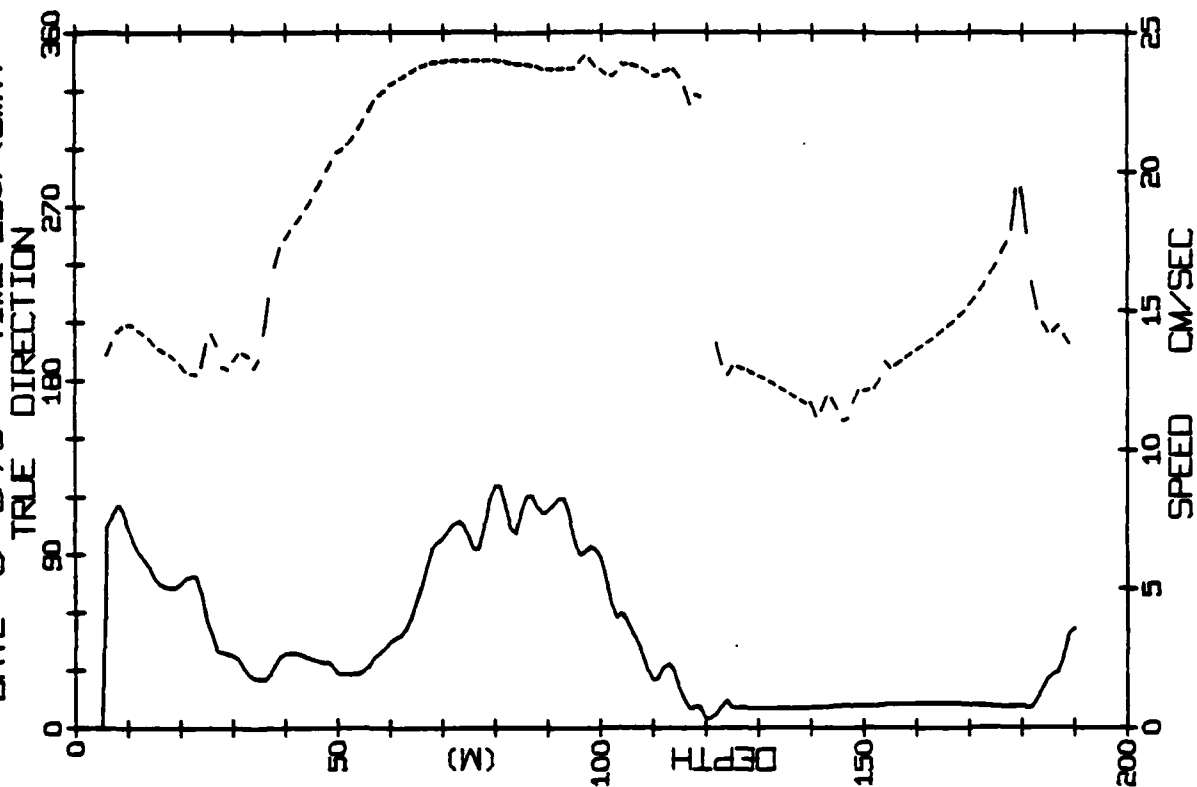
CAMP BLUE FOX STATION 177
DATE 4/ 8/75 TIME 2050 (GMT)



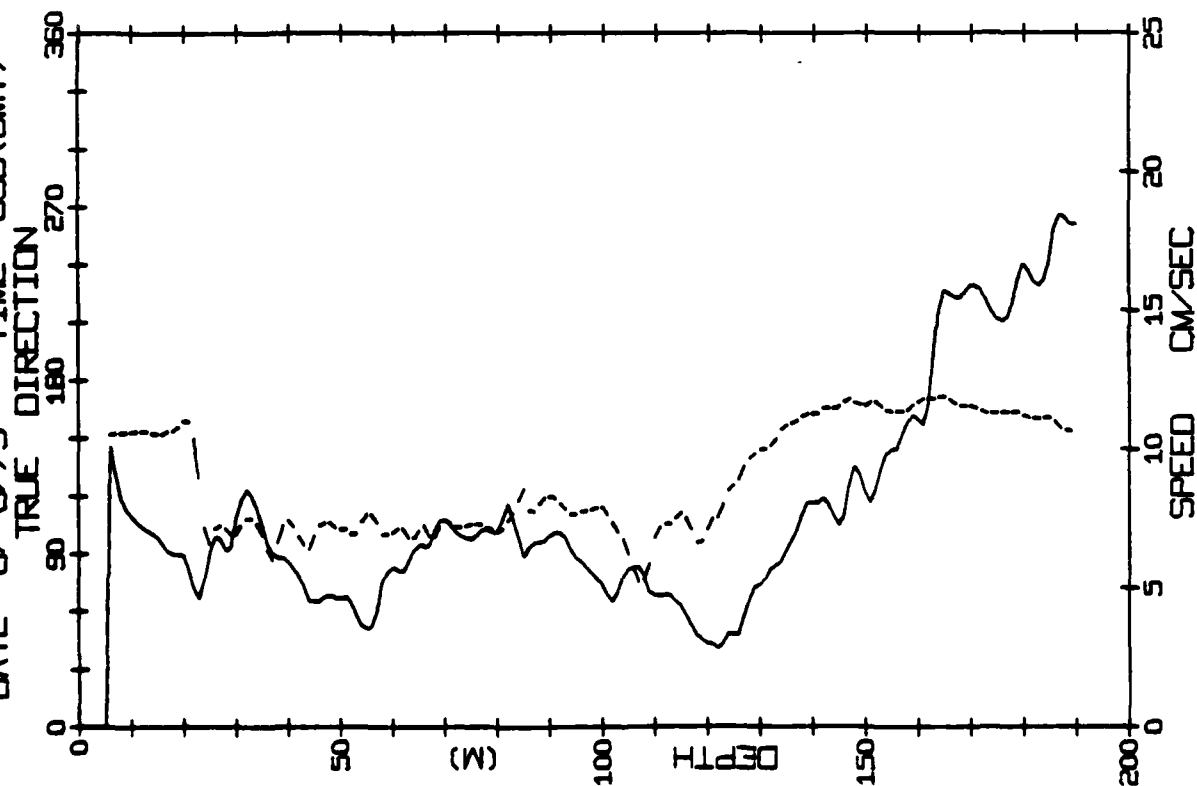
CAMP BLUE FOX STATION 178
DATE 5/ 8/75 TIME 545 (GMT)



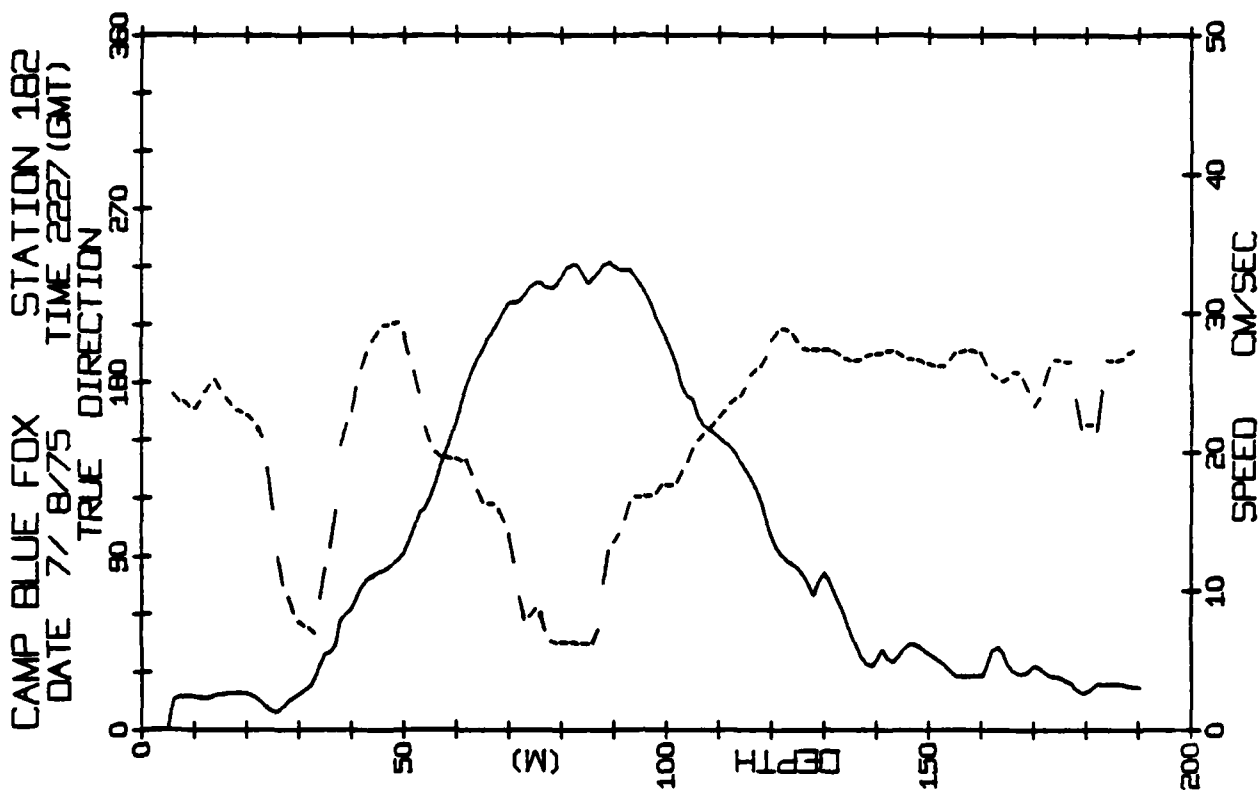
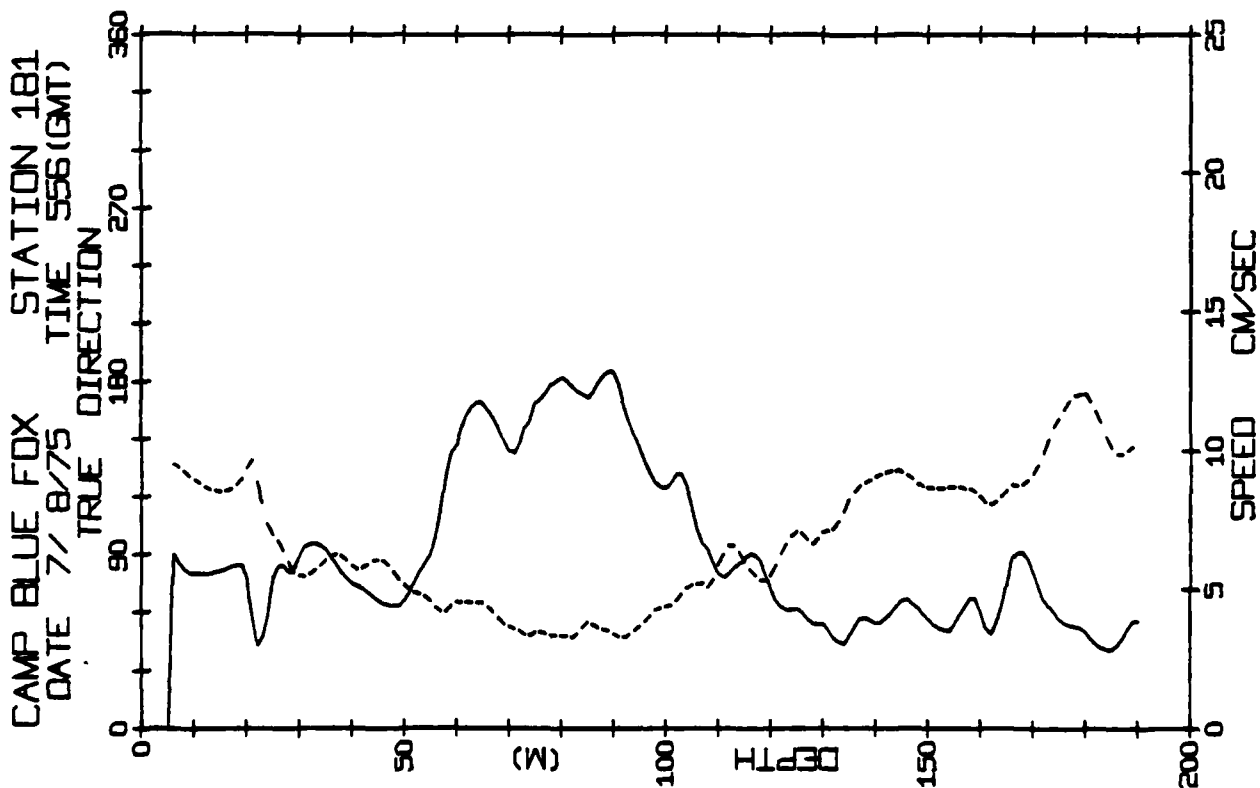
CAMP BLUE FOX STATION 180
DATE 6/8/75 TIME 2107 (GMT)



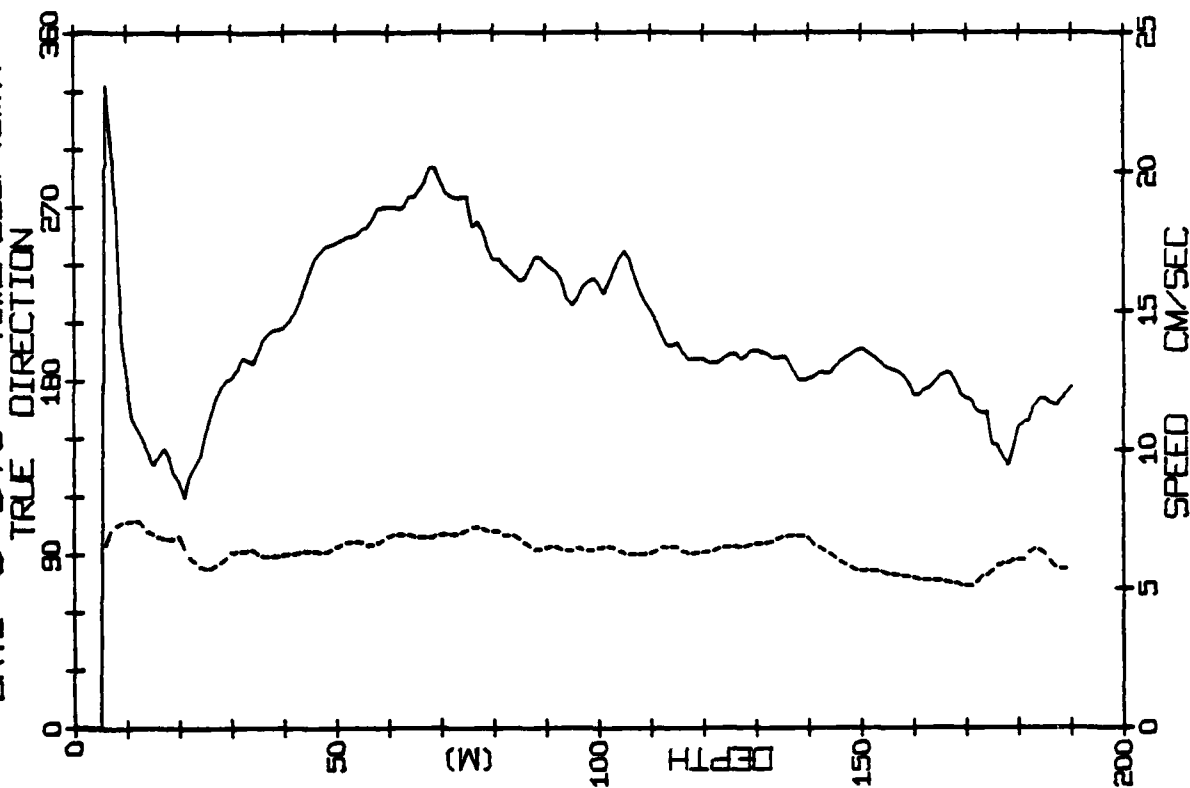
CAMP BLUE FOX STATION 179
DATE 6/8/75 TIME 638 (GMT)



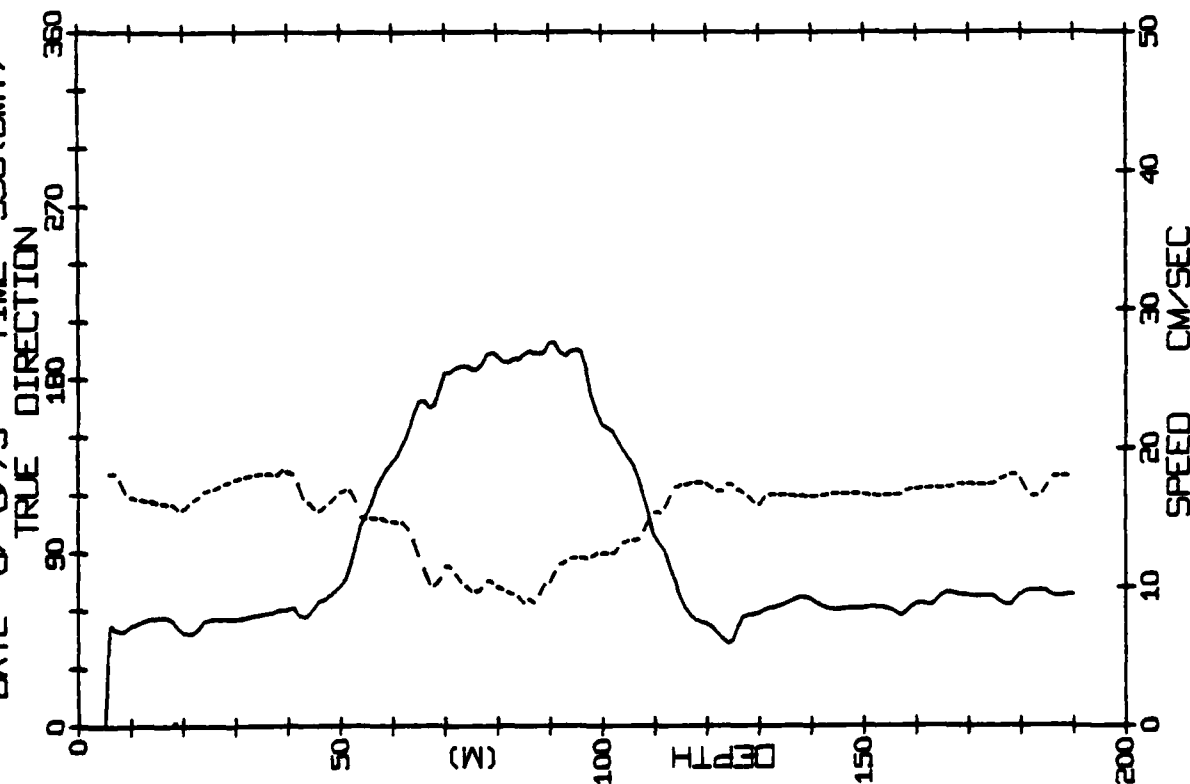
BLUE FOX STATION 179 (190M.) 6/AUG/75 638 GMT
 LAT= 75.1078N LONG= 140.1628W LTER= 2. LOER= 4.
 NINVEL= -9.6 EIVEL= 6.9 NVER= 0. EVER= 0.

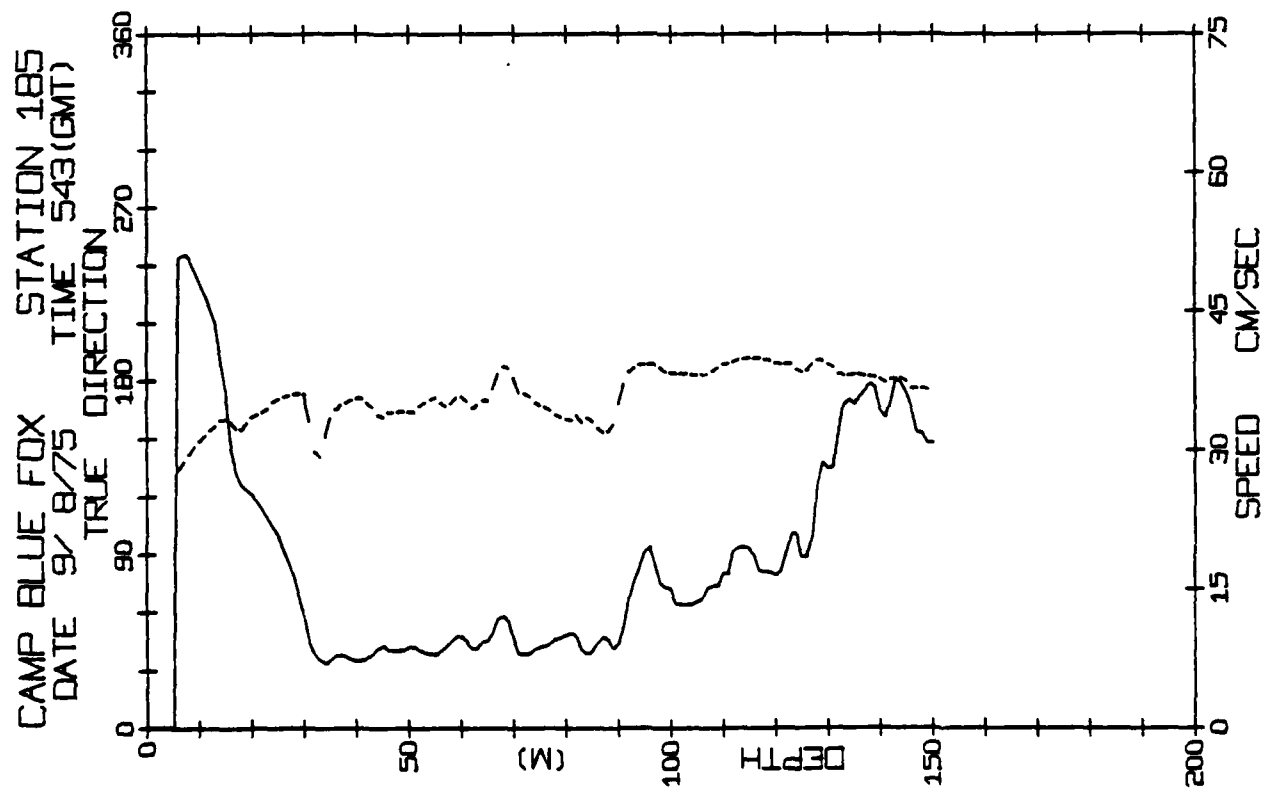
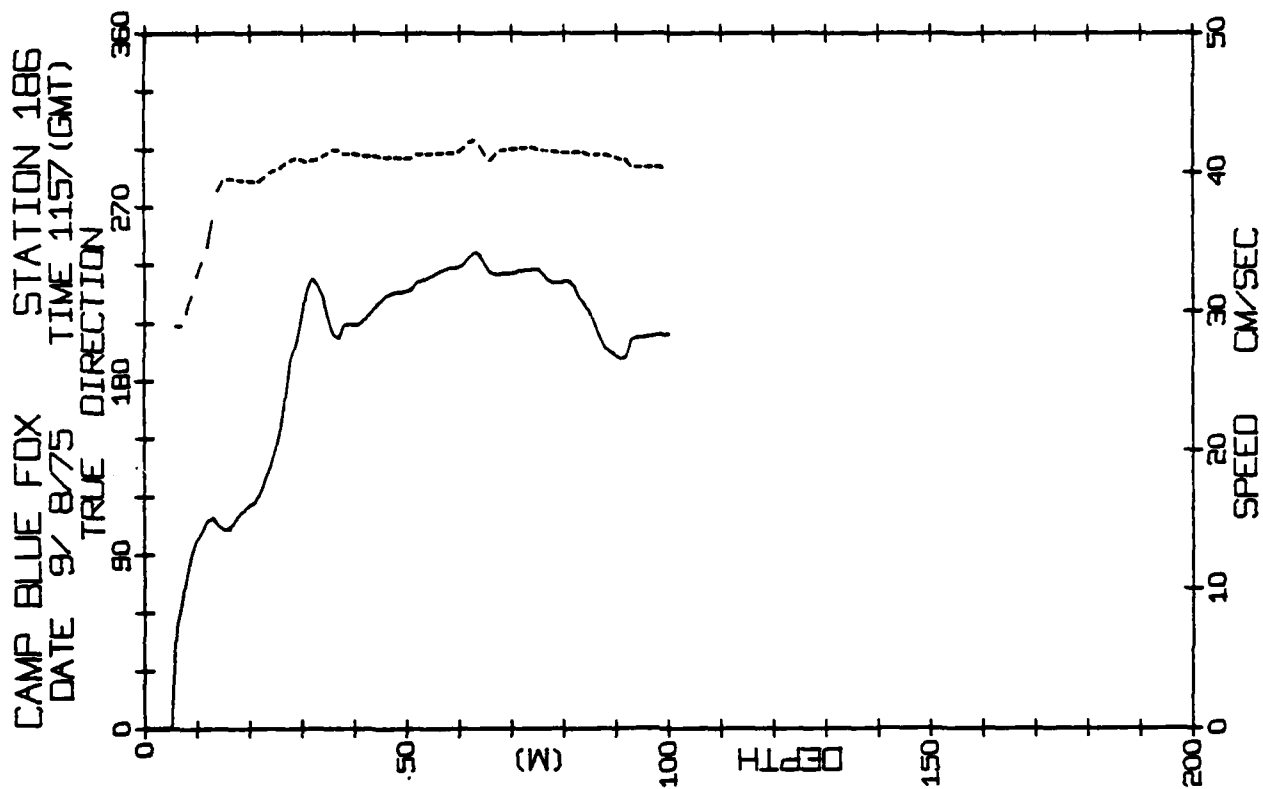


CAMP BLUE FOX STATION 184
DATE 8/ 8/75 TIME 2117 (GMT)



CAMP BLUE FOX STATION 183
DATE 8/ 8/75 TIME 556 (GMT)





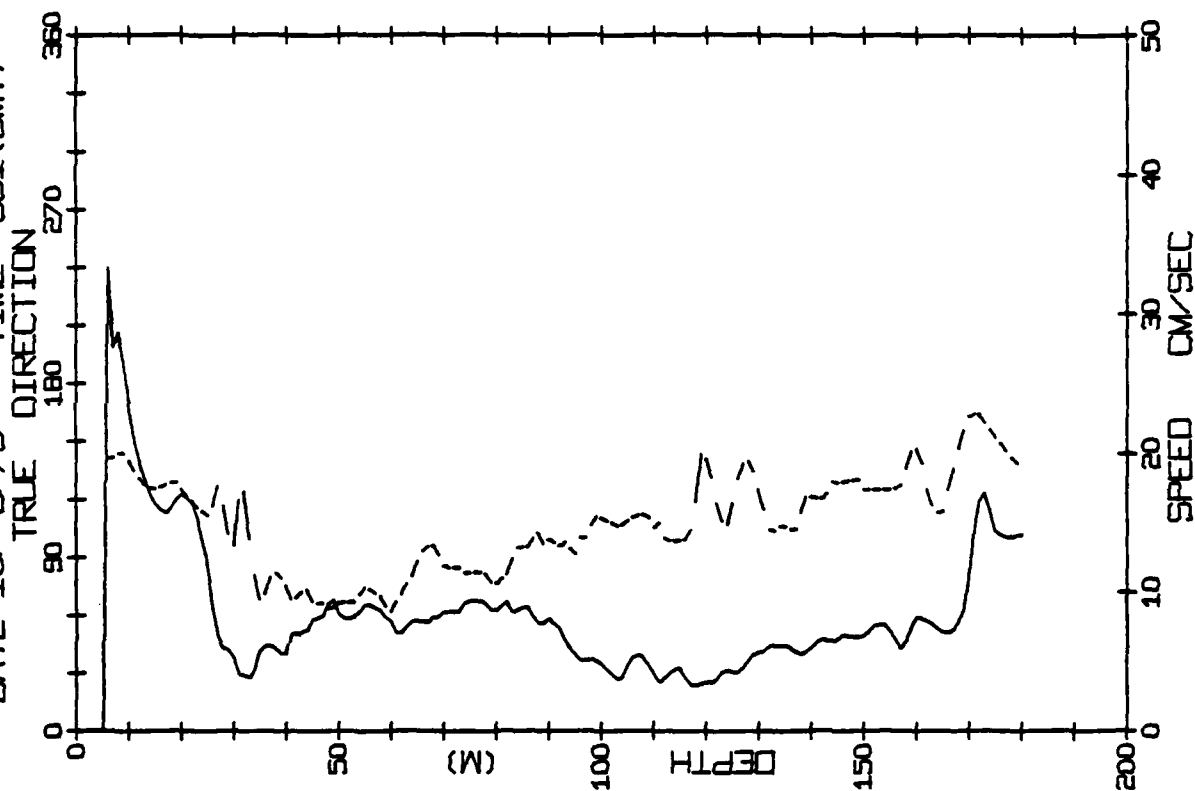
BLUE FOX STATION 186 (100M.) 9/AUG/75 1157 GMT
 LAT= 75.0327N LONG= 139.390W LTER= 2. LOER= 3.
 NVEL= 1.7 EVEL= -1.7 NVER= 0. EVER= 0.

DPT	SPD	DRN	DPT	SPD	DRN
67	67	297	6	60	297
68	68	299	6	60	299
69	69	300	6	60	300
70	70	300	6	60	300
71	71	300	6	60	300
72	72	300	6	60	300
73	73	300	6	60	300
74	74	300	6	60	300
75	75	300	6	60	300
76	76	300	6	60	300
77	77	300	6	60	300
78	78	300	6	60	300
79	79	300	6	60	300
80	80	300	6	60	300
81	81	300	6	60	300
82	82	300	6	60	300
83	83	300	6	60	300
84	84	300	6	60	300
85	85	300	6	60	300
86	86	300	6	60	300
87	87	300	6	60	300
88	88	300	6	60	300
89	89	300	6	60	300
90	90	300	6	60	300
91	91	300	6	60	300
92	92	300	6	60	300
93	93	300	6	60	300
94	94	300	6	60	300
95	95	300	6	60	300
96	96	300	6	60	300
97	97	300	6	60	300
98	98	300	6	60	300
99	99	300	6	60	300
100	100	300	6	60	300

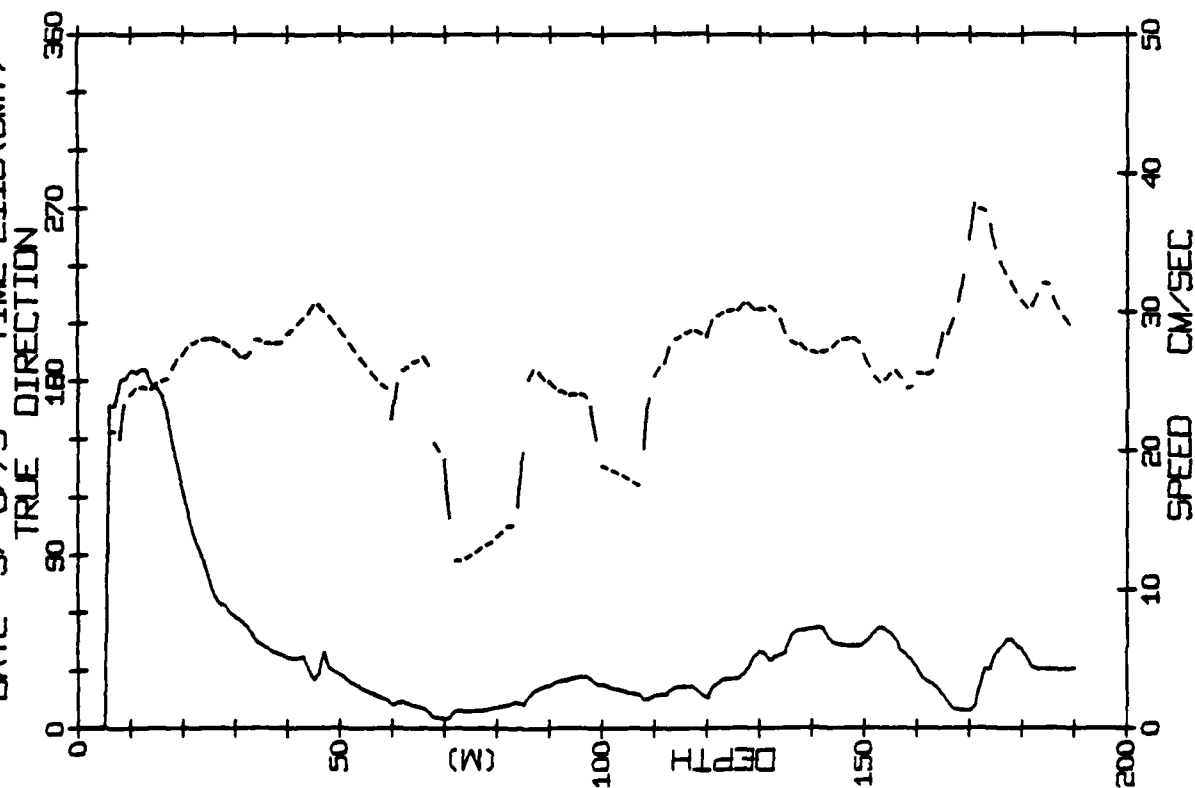
BLUE FOX STATION 185 (150M.) 9/AUG/75 543 GMT
 LAT= 75.0812N LONG= 139.4352W LTER= 2. LOER= 4.
 NVEL= -25.7 EVEL= -27.9 NVER= 0. EVER= 0.

DPT	SPD	DRN	DPT	SPD	DRN
67	67	183	4	20	183
68	68	183	4	20	183
69	69	183	4	20	183
70	70	183	4	20	183
71	71	183	4	20	183
72	72	183	4	20	183
73	73	183	4	20	183
74	74	183	4	20	183
75	75	183	4	20	183
76	76	183	4	20	183
77	77	183	4	20	183
78	78	183	4	20	183
79	79	183	4	20	183
80	80	183	4	20	183
81	81	183	4	20	183
82	82	183	4	20	183
83	83	183	4	20	183
84	84	183	4	20	183
85	85	183	4	20	183
86	86	183	4	20	183
87	87	183	4	20	183
88	88	183	4	20	183
89	89	183	4	20	183
90	90	183	4	20	183
91	91	183	4	20	183
92	92	183	4	20	183
93	93	183	4	20	183
94	94	183	4	20	183
95	95	183	4	20	183
96	96	183	4	20	183
97	97	183	4	20	183
98	98	183	4	20	183
99	99	183	4	20	183
100	100	183	4	20	183

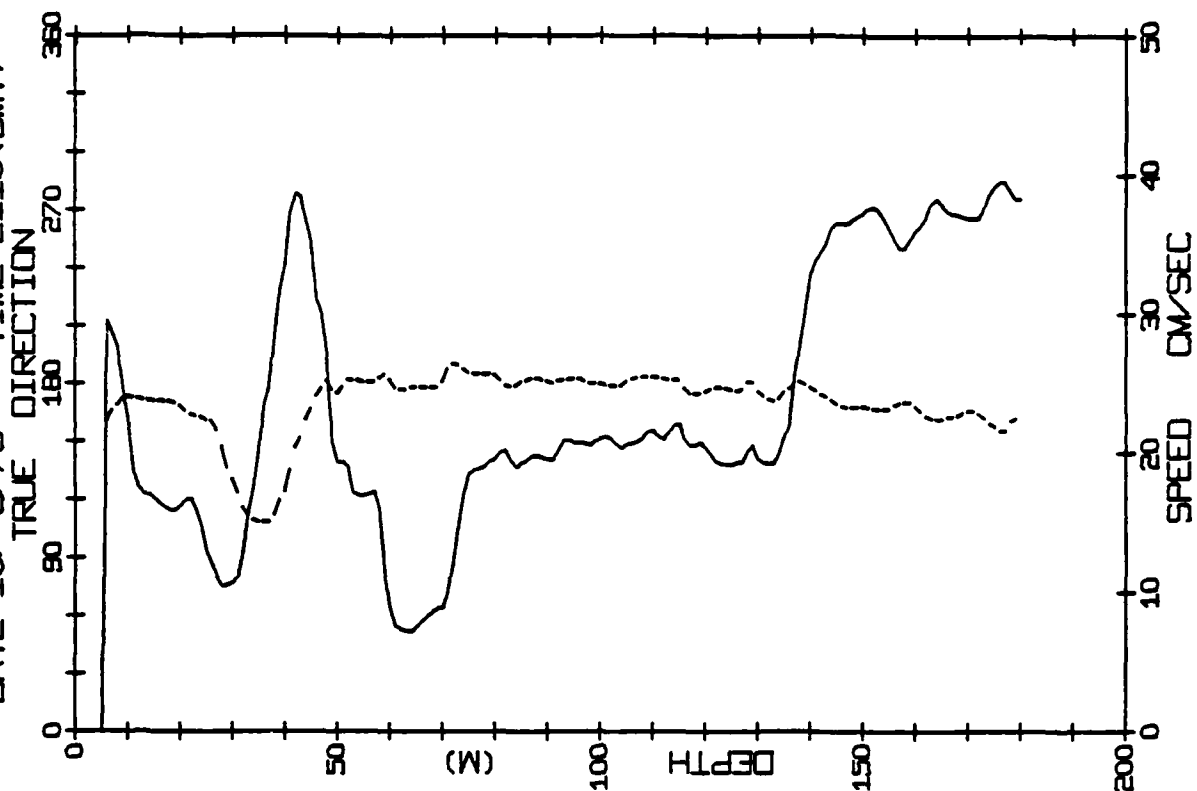
CAMP BLUE FOX STATION 188
DATE 10/ 8/75 TIME 551 (GMT)



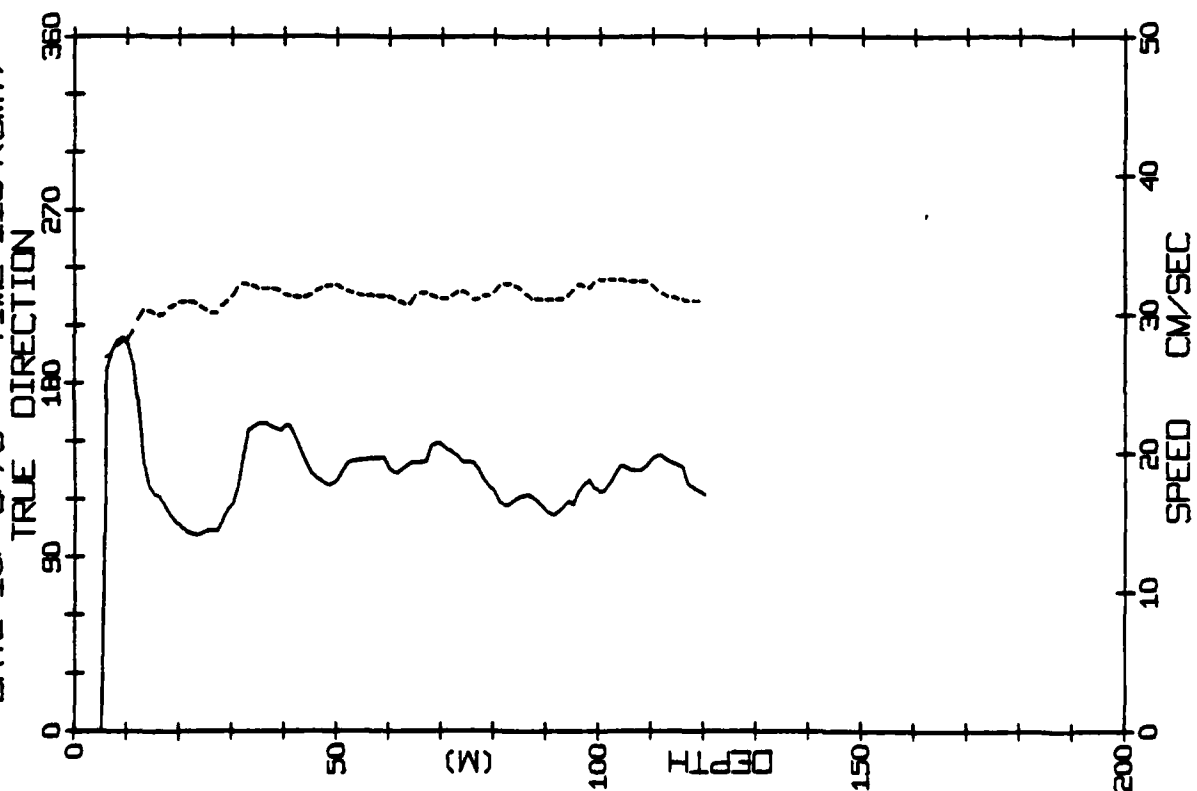
CAMP BLUE FOX STATION 187
DATE 9/ 8/75 TIME 2115 (GMT)



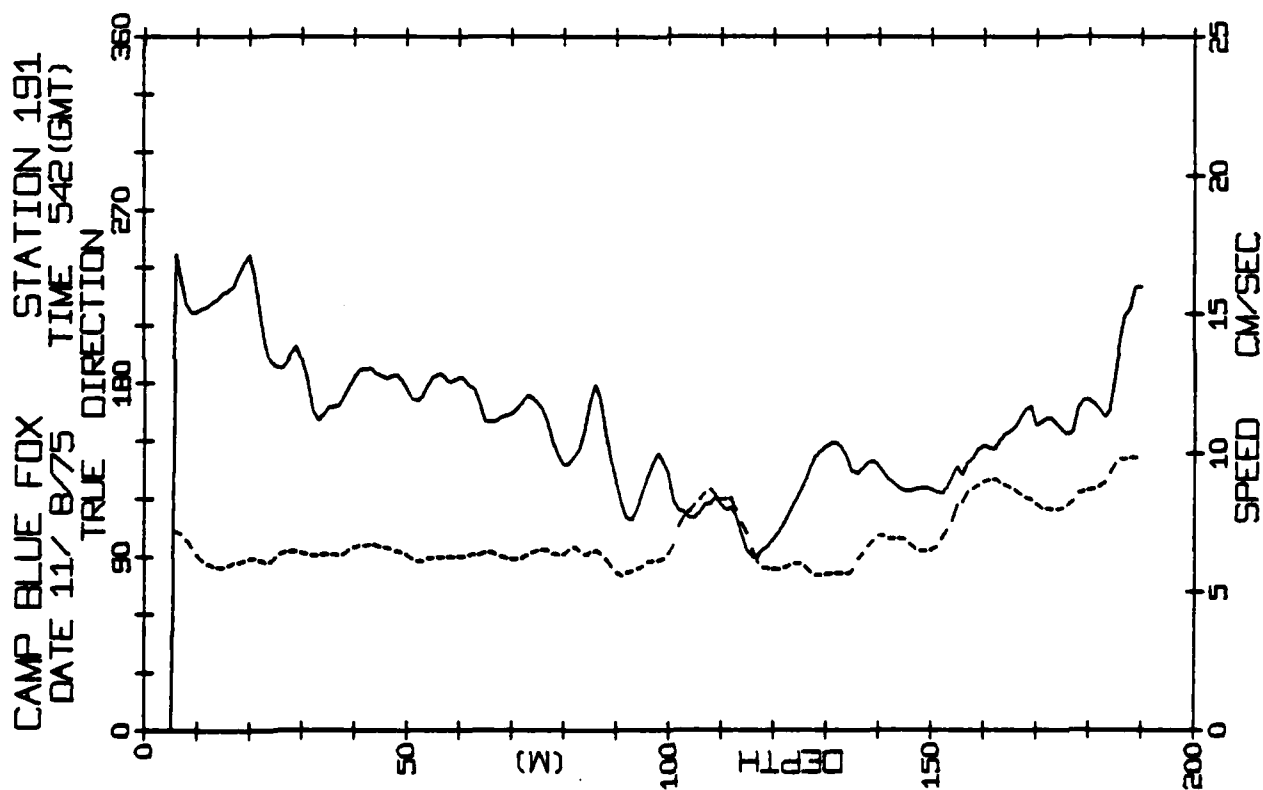
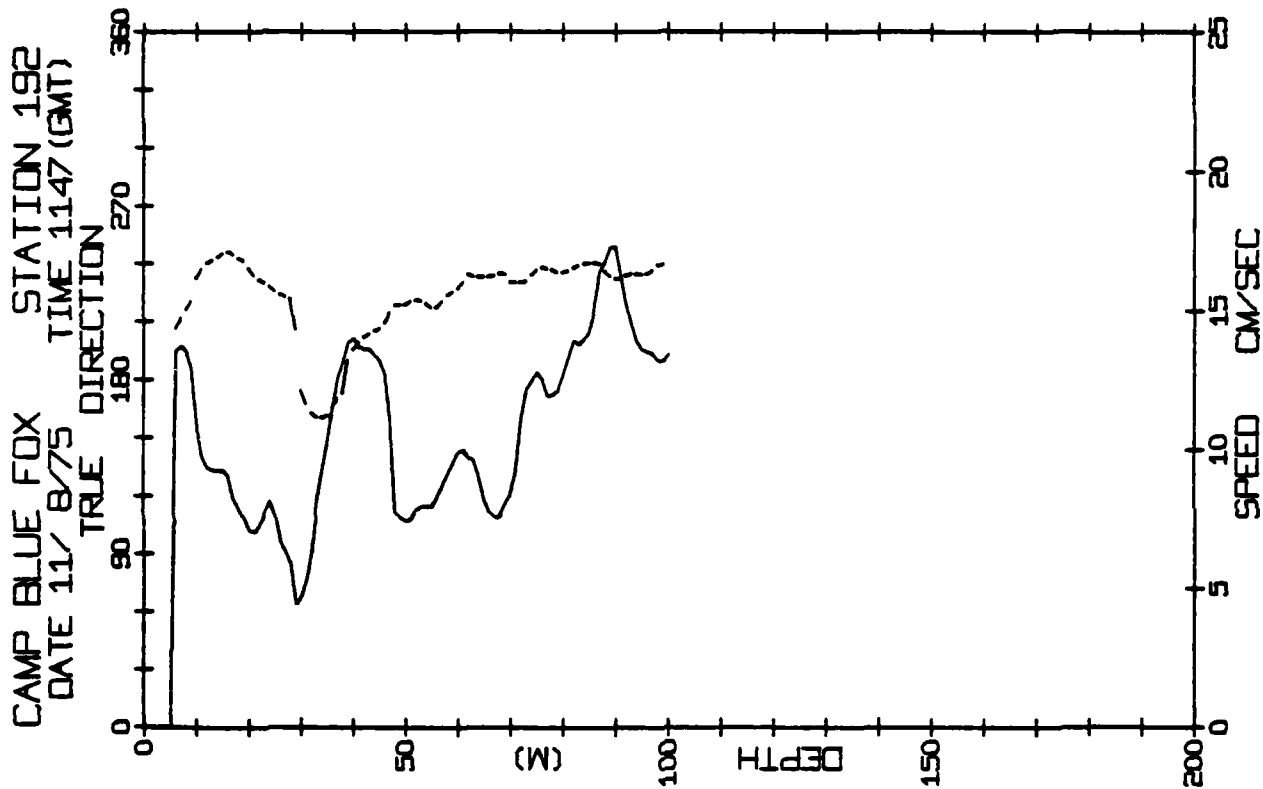
CAMP BLUE FOX STATION 190
DATE 10/ 8/75 TIME 2110(GMT)



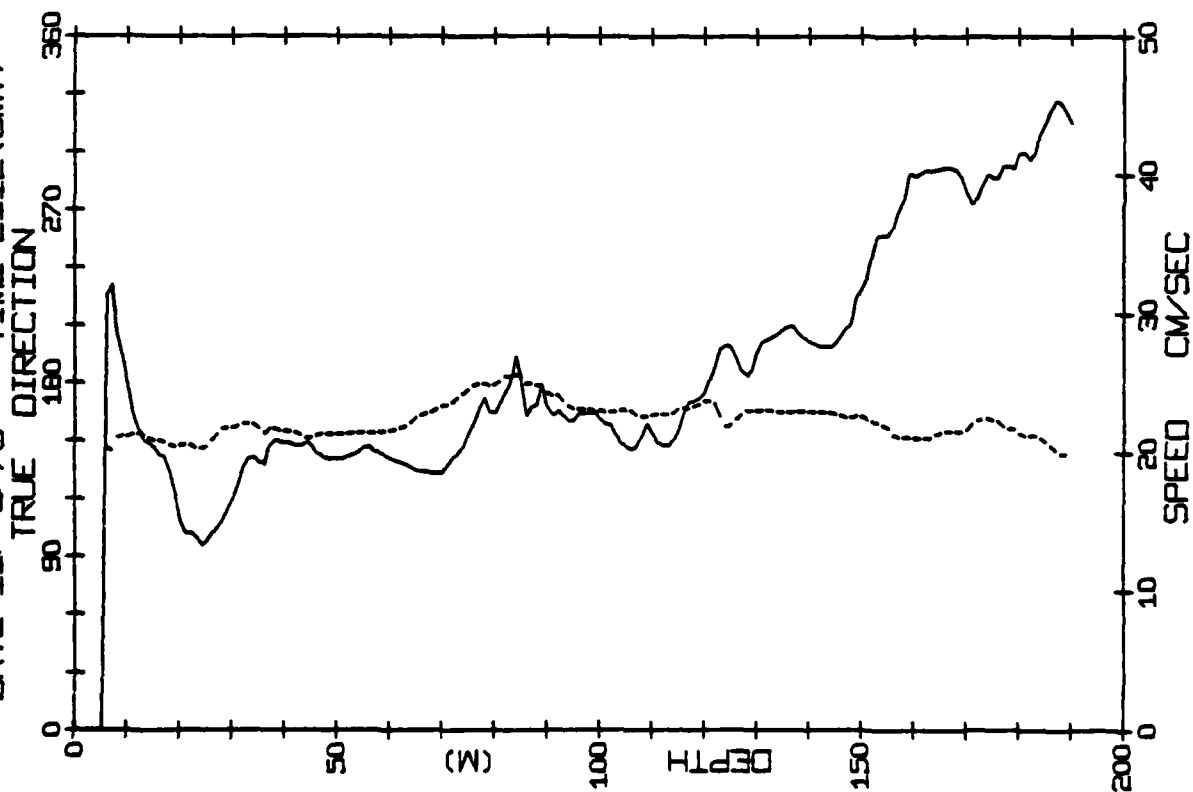
CAMP BLUE FOX STATION 189
DATE 10/ 8/75 TIME 1134(GMT)



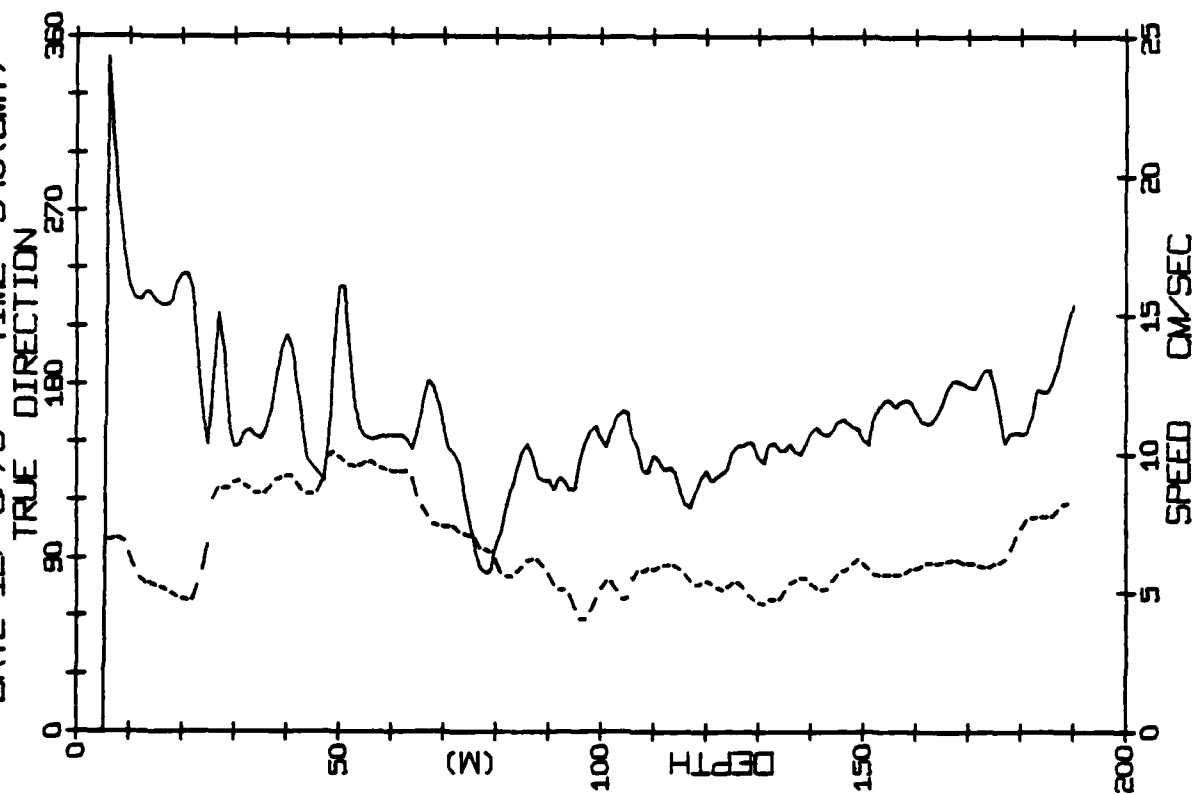
BLUE FOX STATION 189 (120M.) 10/AUG/75 1134 GMT
LAT= 74.9676N LONG= 138.8963W LTER= 0 LOER= 1
NIVEL= -19.3 EIVEL= -0.6 NVER= 0 EVER= 0



CAMP BLUE FOX STATION 193
DATE 11/ 8/75 TIME 2112(GMT)

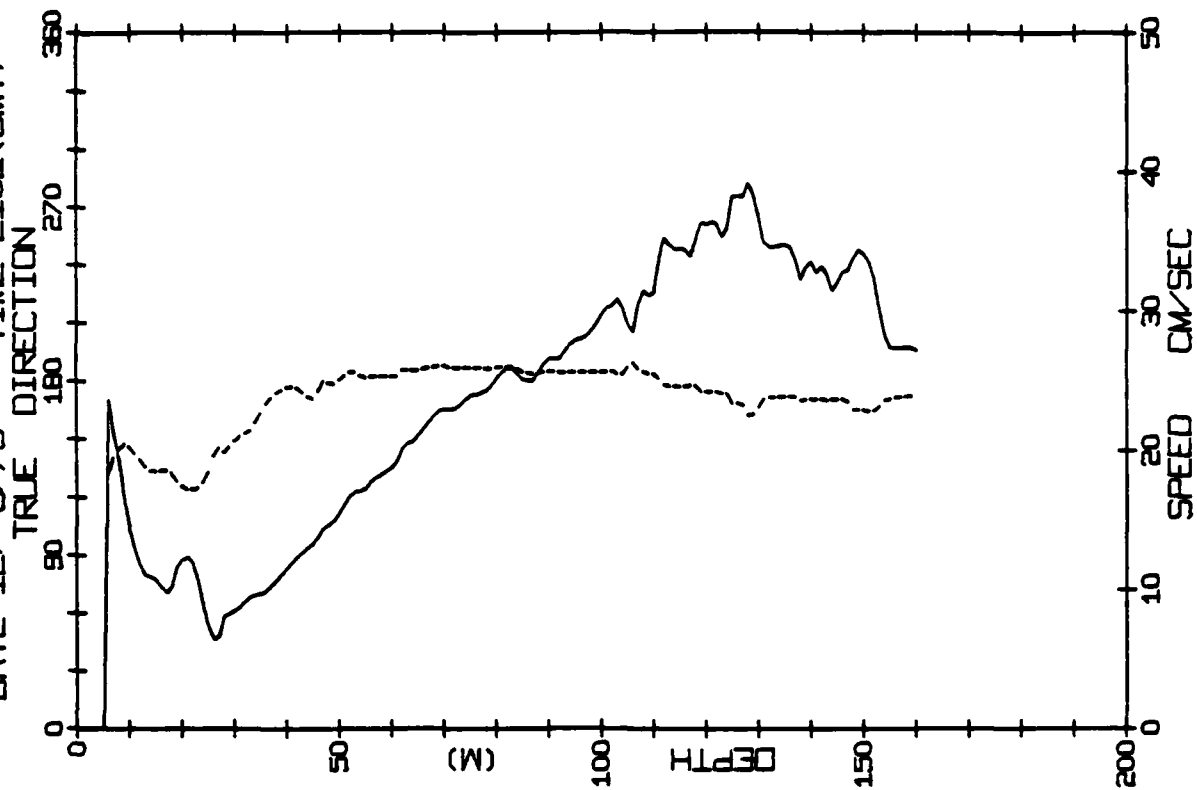


CAMP BLUE FOX STATION 194
DATE 12/ 8/75 TIME 540(GMT)

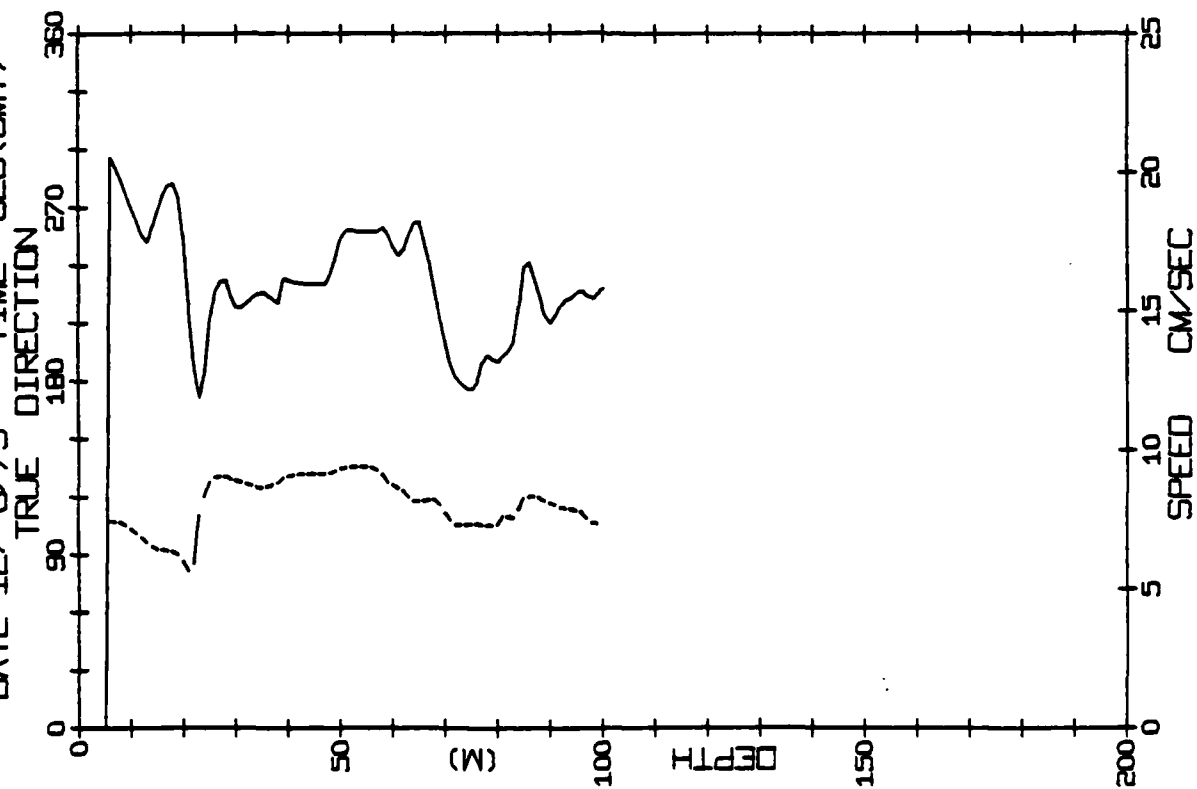


BLUE FOX STATION 193 (190M.) 11/AUG/75 2112 GMT
LAT= 74.8848N LONG= 138.4230W LTER= 0. LGER= 0.
NIVEL= -19.4 EIVEL= 18.2 NVER= 0. EVER= 0.

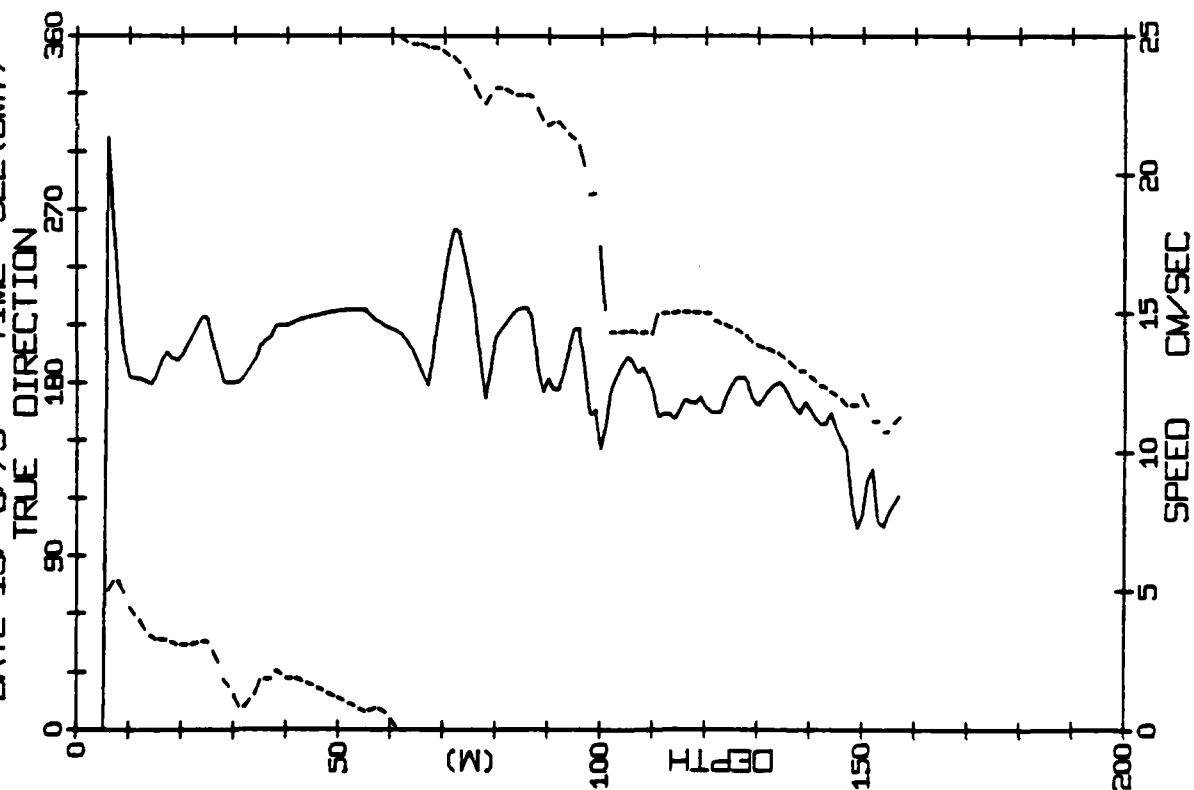
CAMP BLUE FOX STATION 196
DATE 12/ 8/75 TIME 2102(GMT)



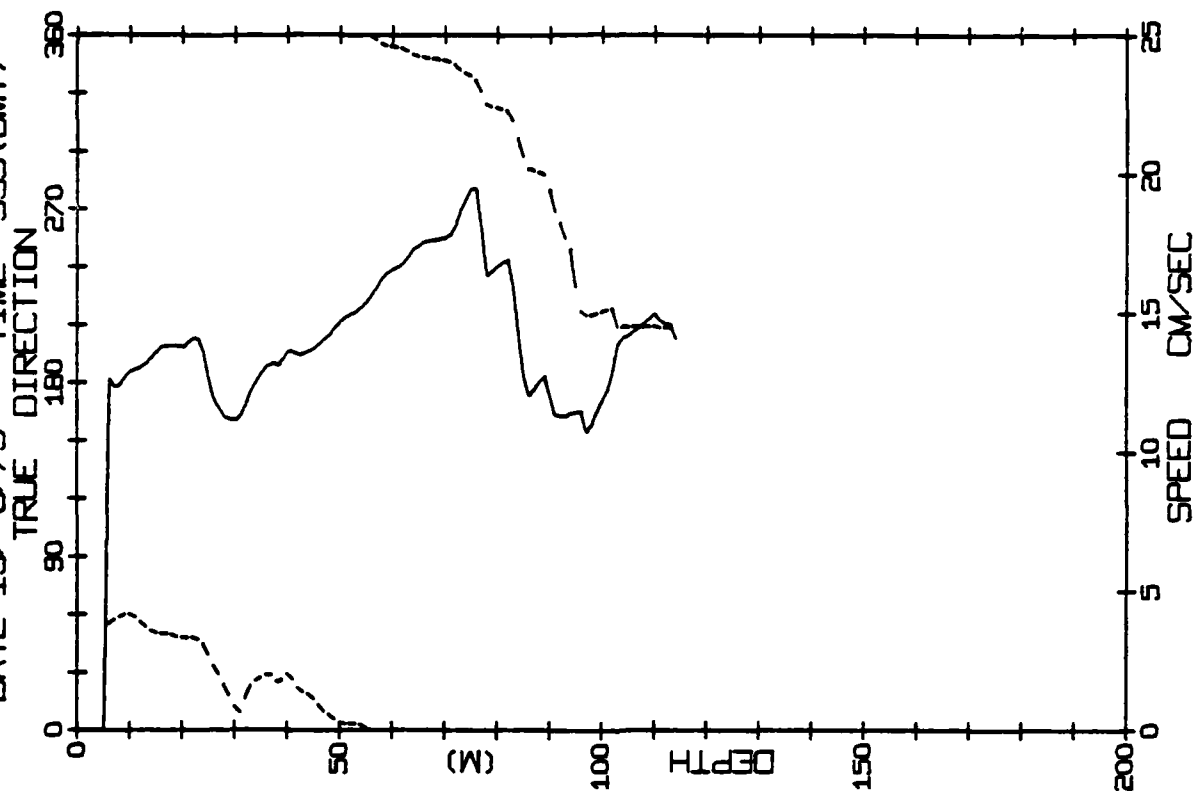
CAMP BLUE FOX STATION 195
DATE 12/ 8/75 TIME 628(GMT)



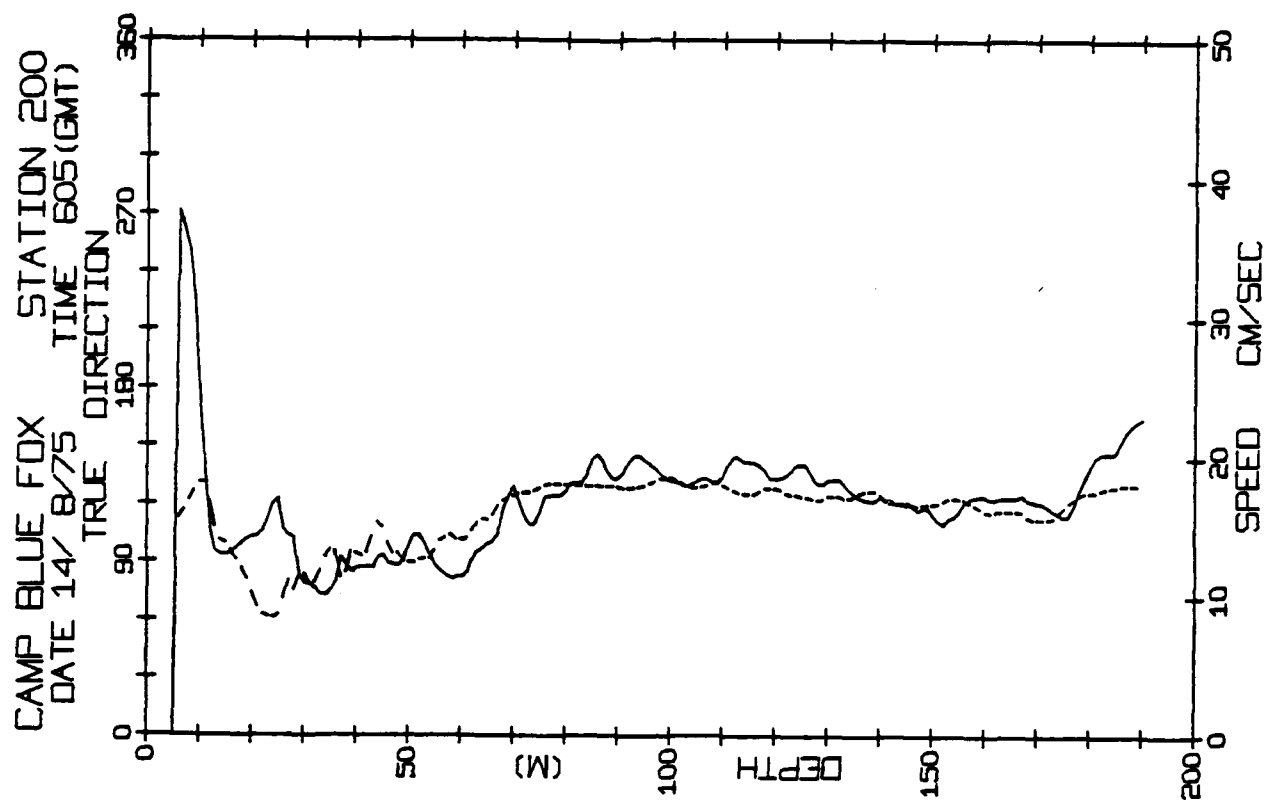
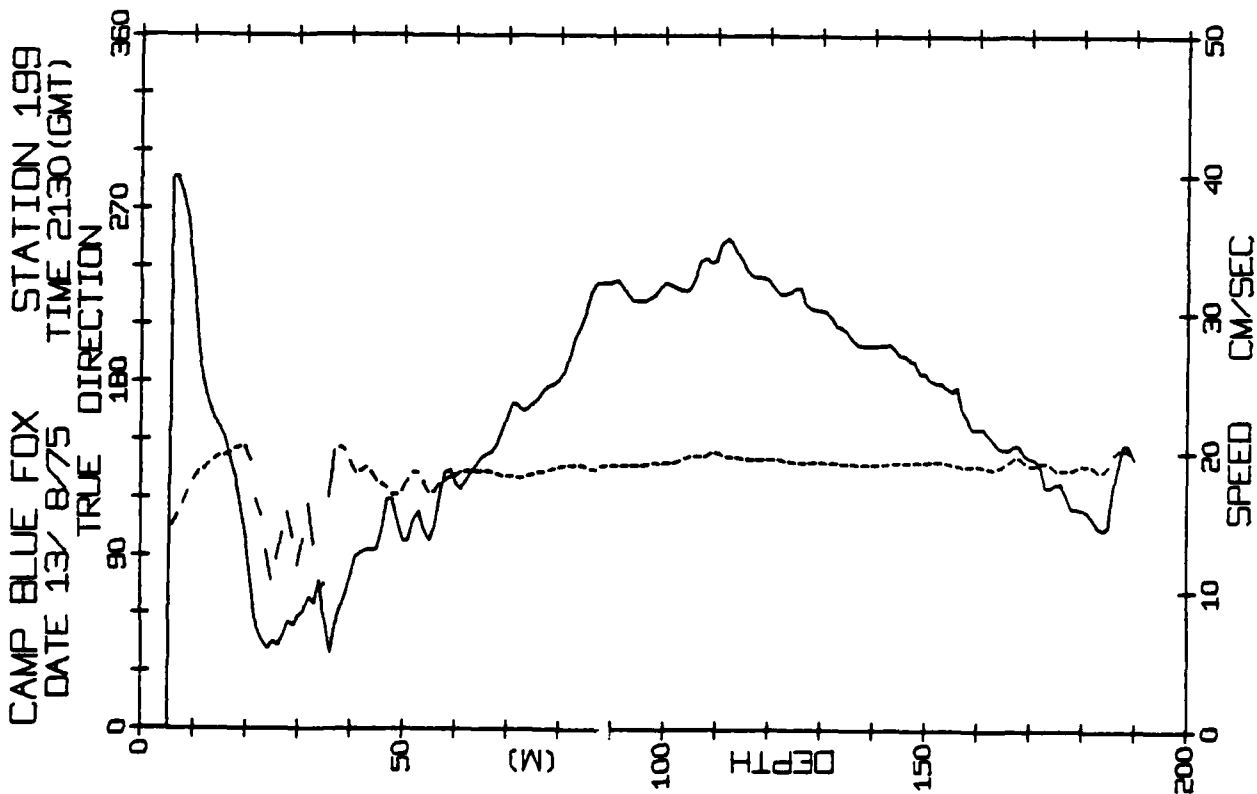
CAMP BLUE FOX STATION 197
DATE 13/ 8/75 TIME 522 (GMT)



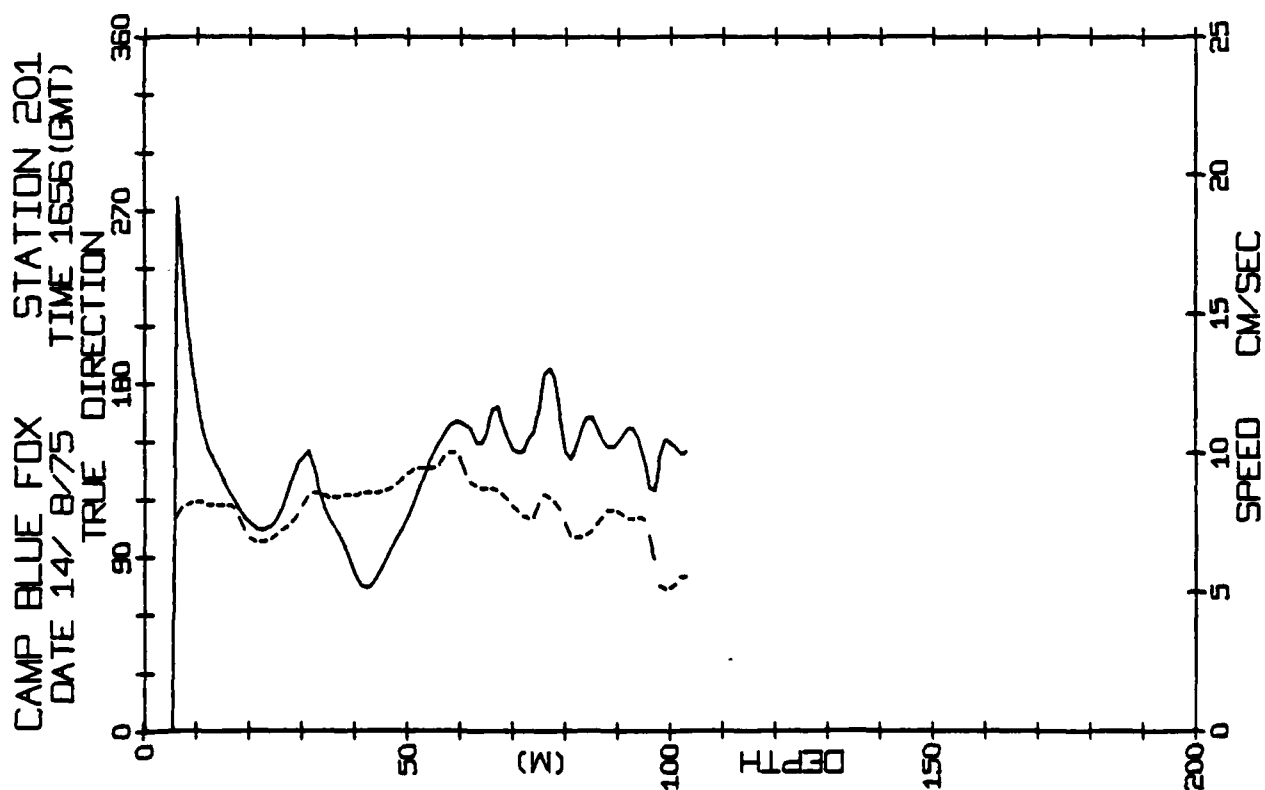
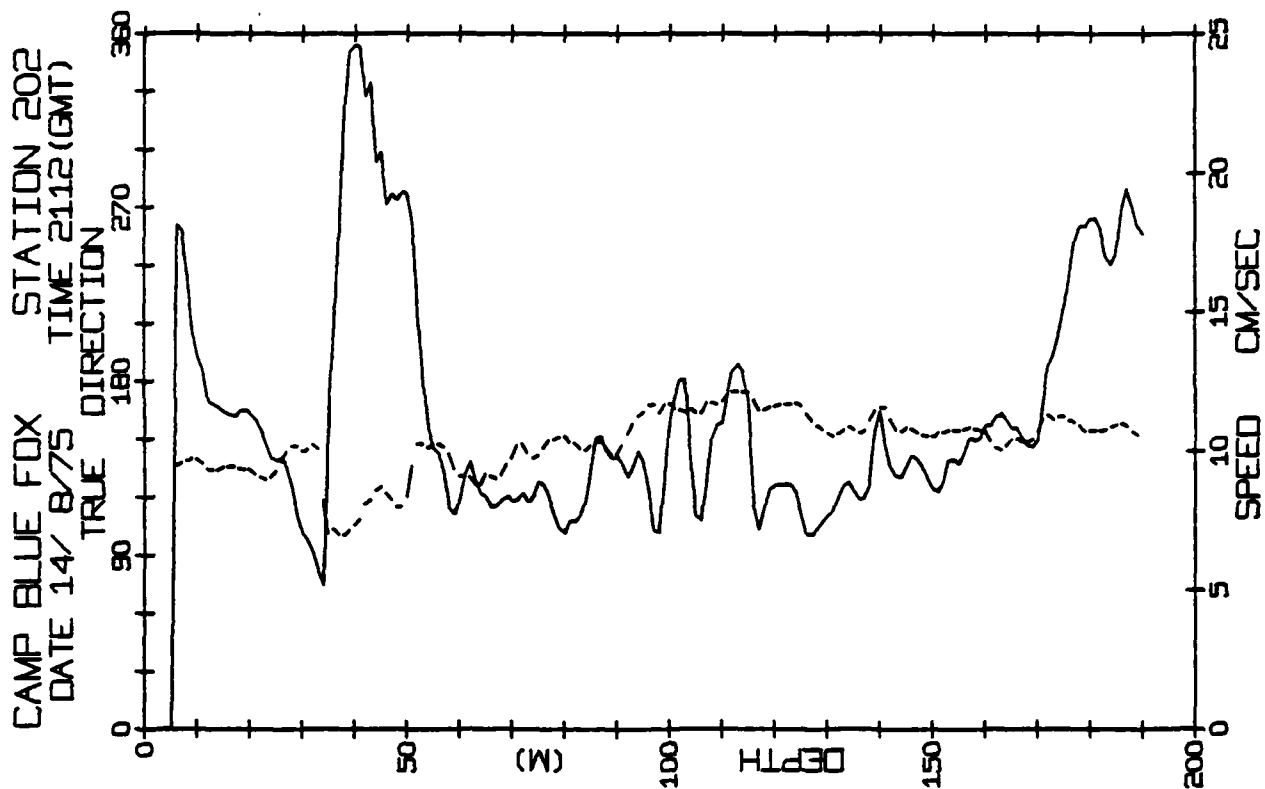
CAMP BLUE FOX STATION 198
DATE 13/ 8/75 TIME 535 (GMT)



BLUE FOX STATION 197 (157M.) 13/AUG/75 522 GMT
LAT= 74.8371N LONG= 137.9418W LTER= 1. LOER= 1.
NIVEL= 10.2 EIVEL= 15.9 NVER= 0. EVER= 0.



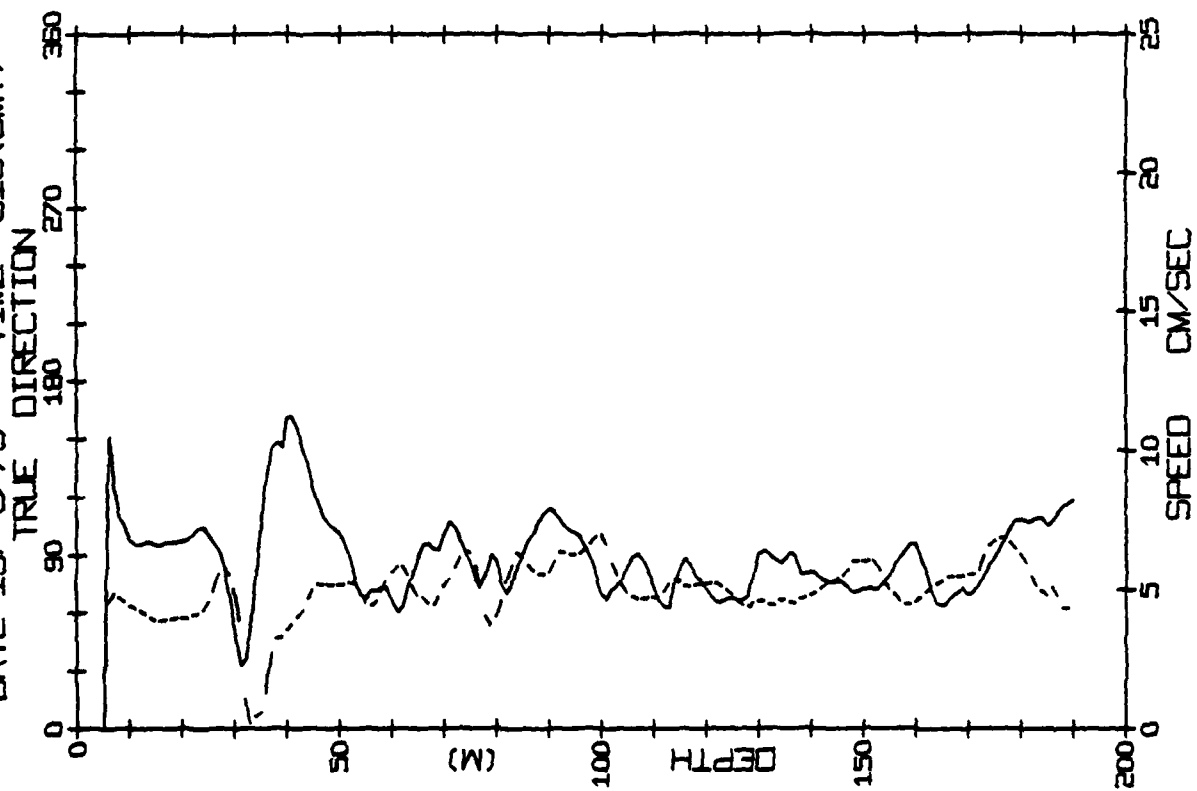
BLUE FOX STATION 199 (190M.) 13/AUG/75 2130 GMT
 LAT= 74.9069N LONG= 137.6619W LTER= 23 LOER= 48
 NIVEL= -6.9 EIVEL= 27.4 NVER= 0 EVER= 1.



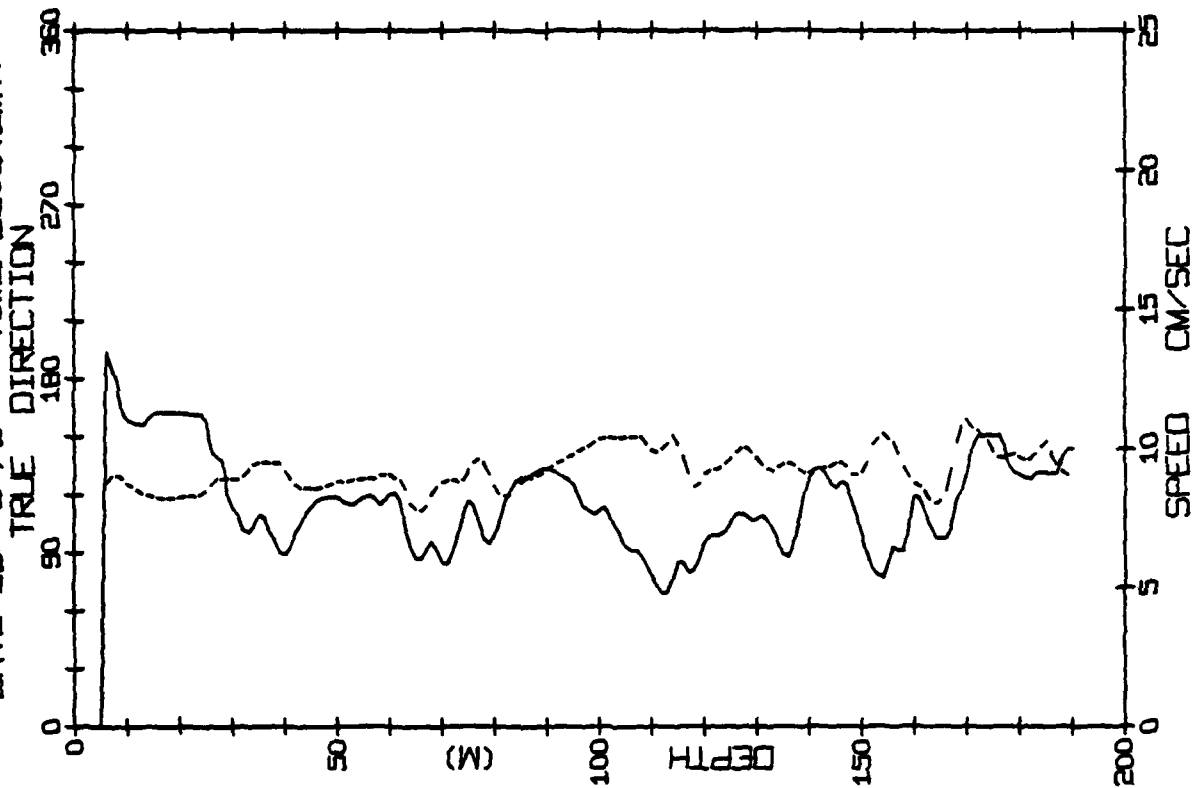
BLUE FOX STATION 202 (190M.)
LAT= 74.8349N LONG= 137.1870W
NIVEL= -8.9 EIVEL= 14.4

BLUE FOX STATION 201 (103M.)
LAT= 74.8395N LONG= 137.2796W
NIVEL= -0.9 EIVEL= 15.3

CAMP BLUE FOX STATION 203
DATE 15/ 8/75 TIME 618(GMT)



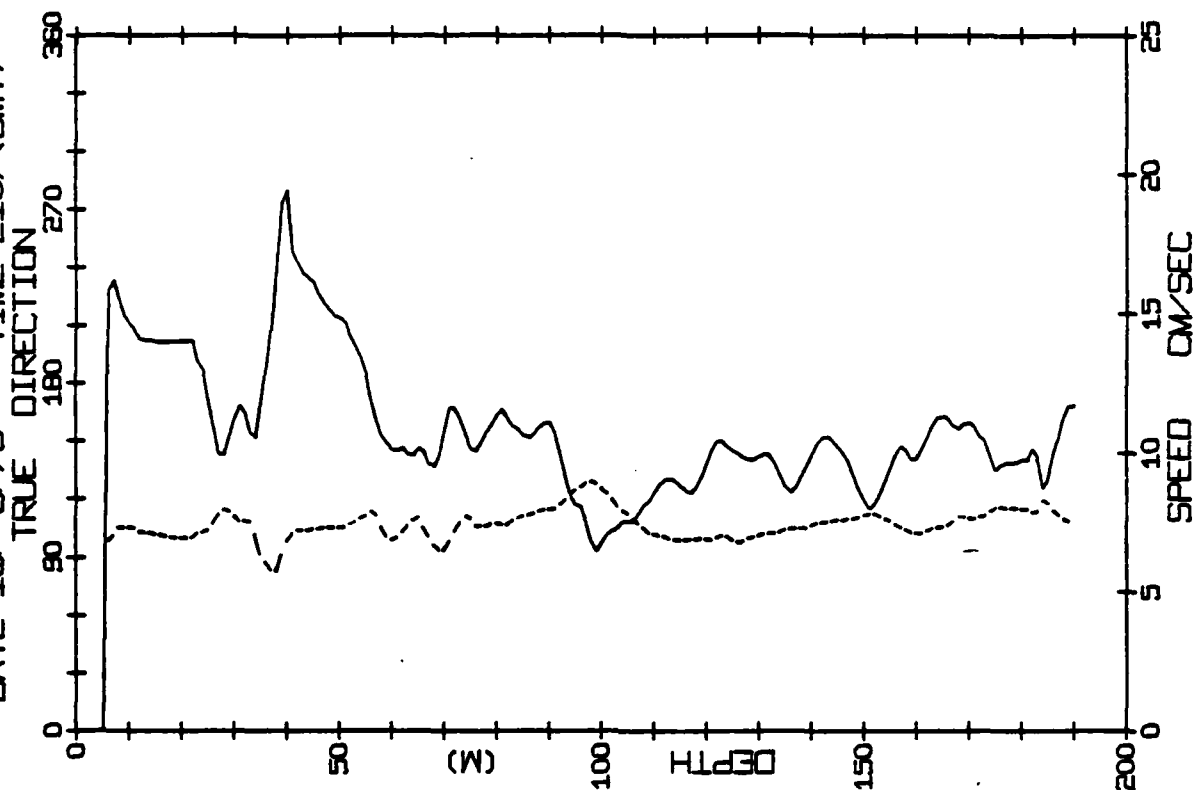
CAMP BLUE FOX STATION 205
DATE 15/ 8/75 TIME 2108(GMT)



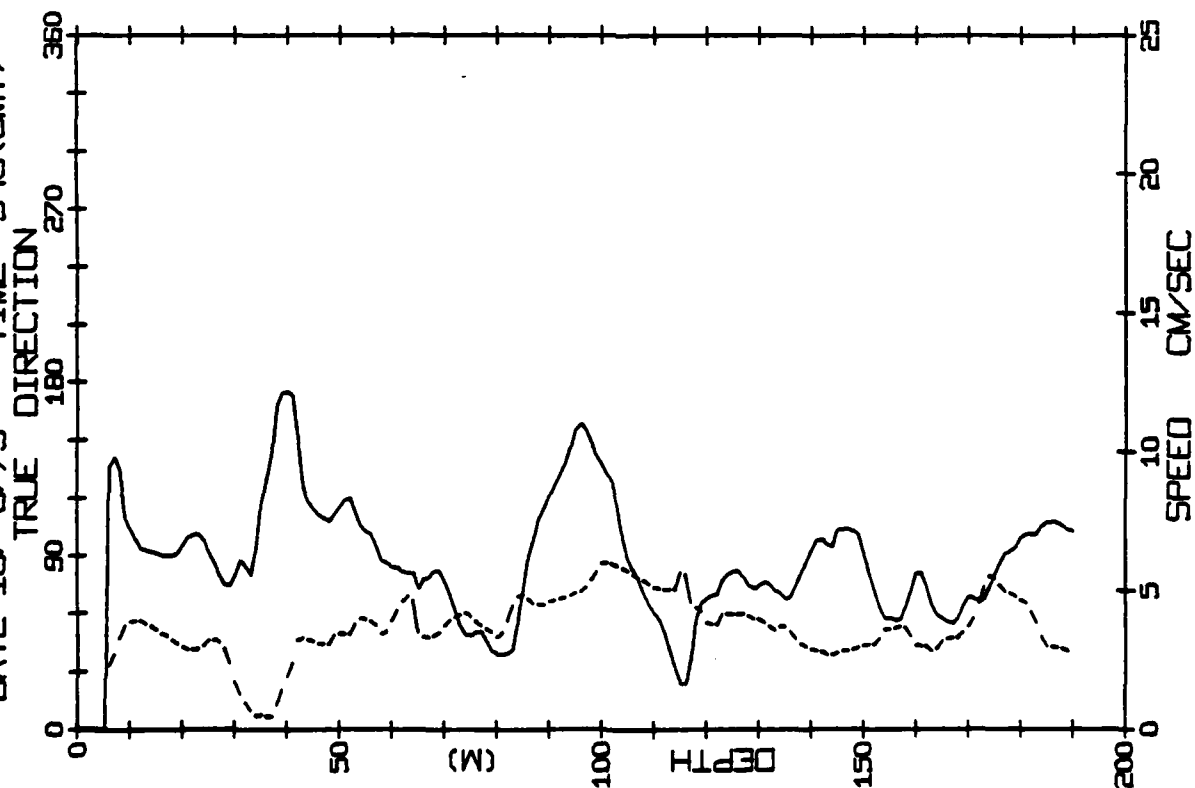
BLUE FOX STATION 203 (190M.) 19/AUG/75 618 GMT
LAT= 74.8256N LONG= 137.1172W LTER= 0. LOER= 0.
NIVEL= 5.6 EIVEL= 6.4 NVER= 0. EVER= 0.

DPT 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

CAMP BLUE FOX STATION 208
DATE 16/ 8/75 TIME 2107 (GMT)



CAMP BLUE FOX STATION 206
DATE 16/ 8/75 TIME 543 (GMT)

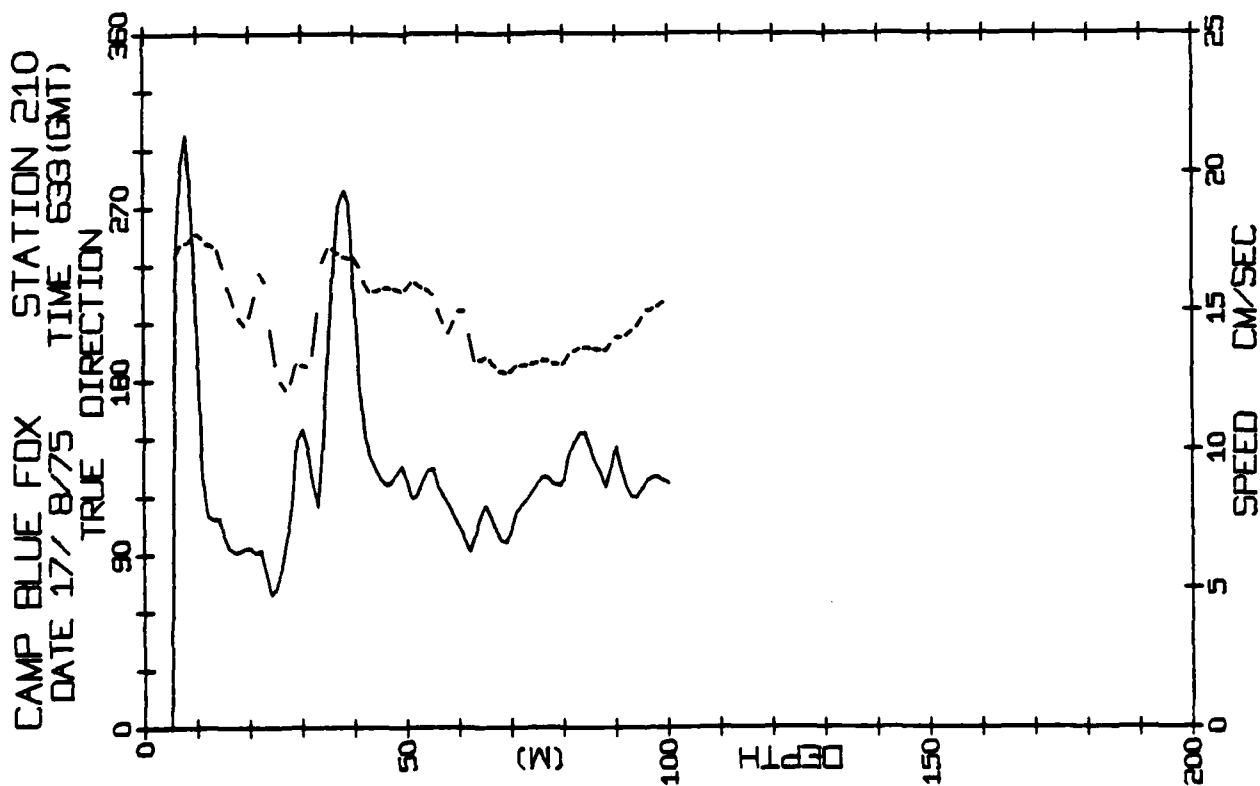
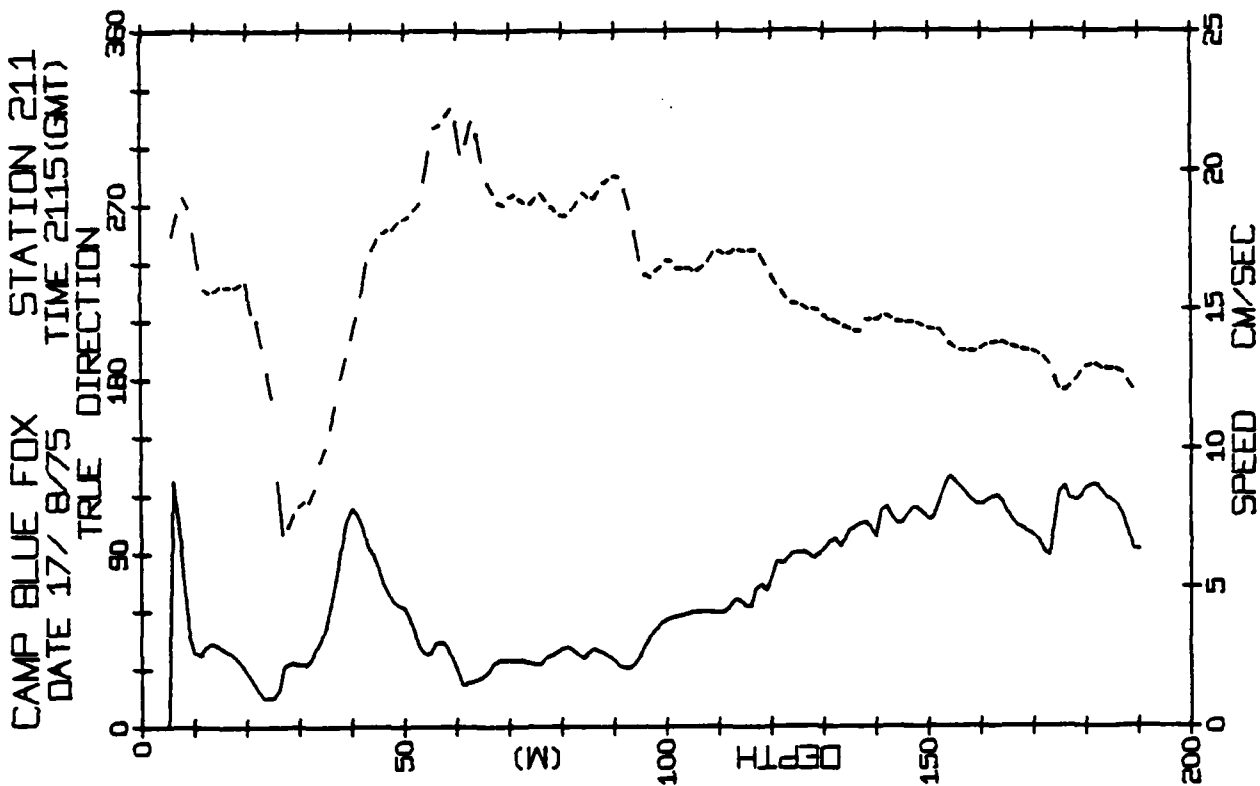


BLUE FOX STATION 206 (190M.) 16/AUG/75 543 QMT
LAT= 74.8178N LONG= 137.0991W LTER= 1. LOER= 2.
NIVEL= 7.1 EIVEL= 4.7 NVER= 0. EVER= 0.

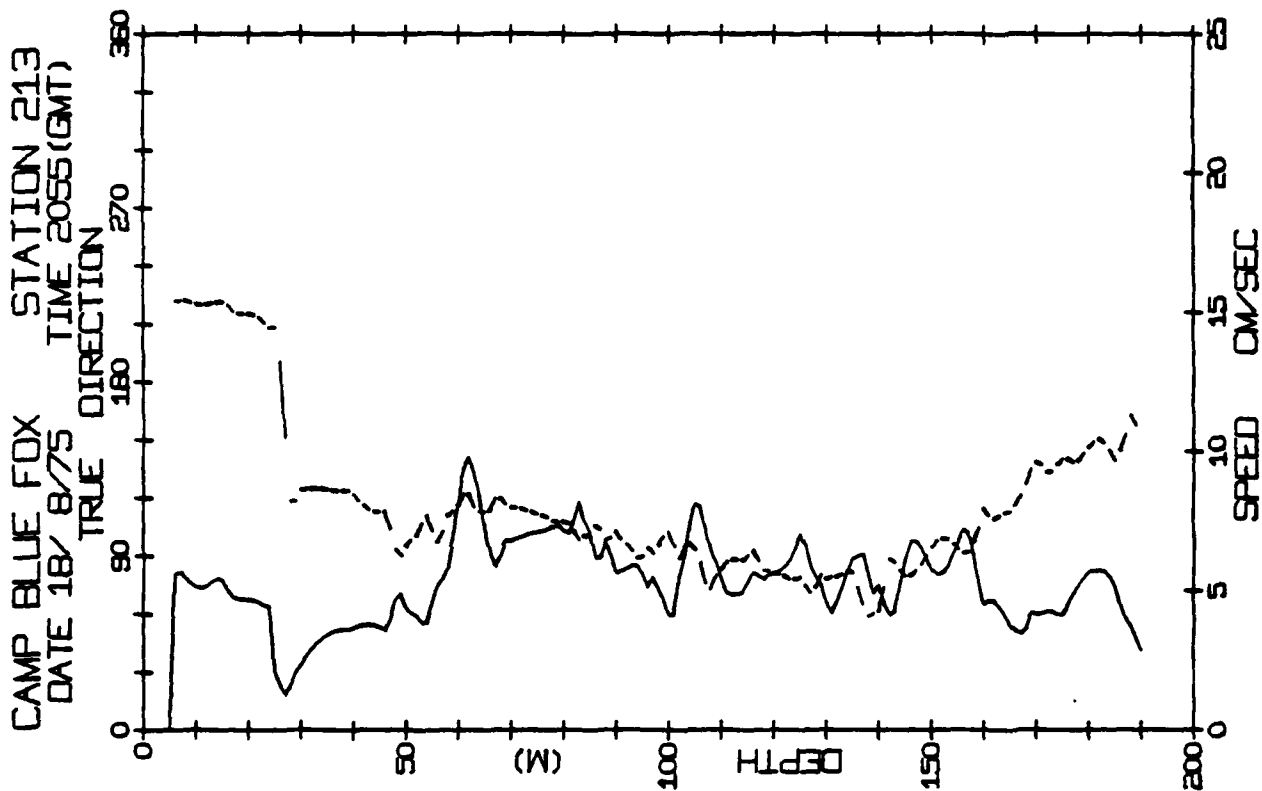
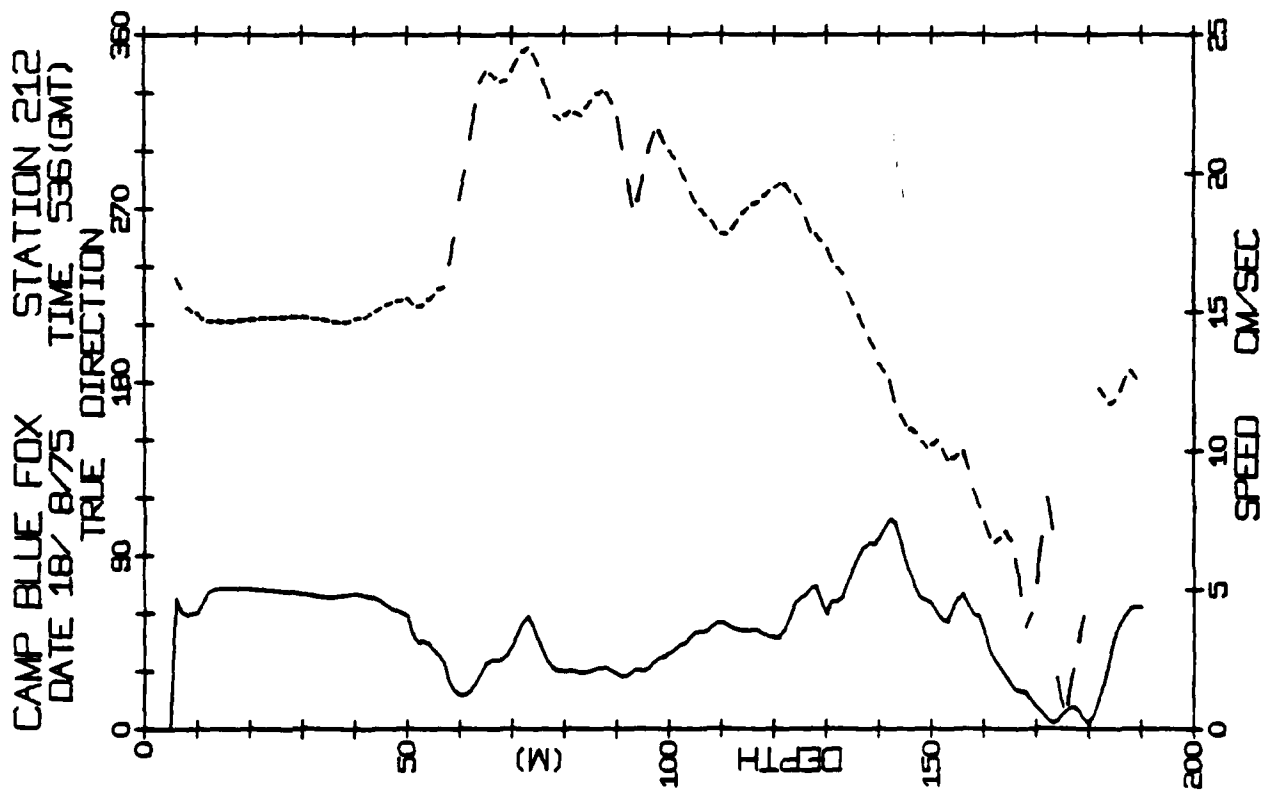
DRIN	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
DRIN	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

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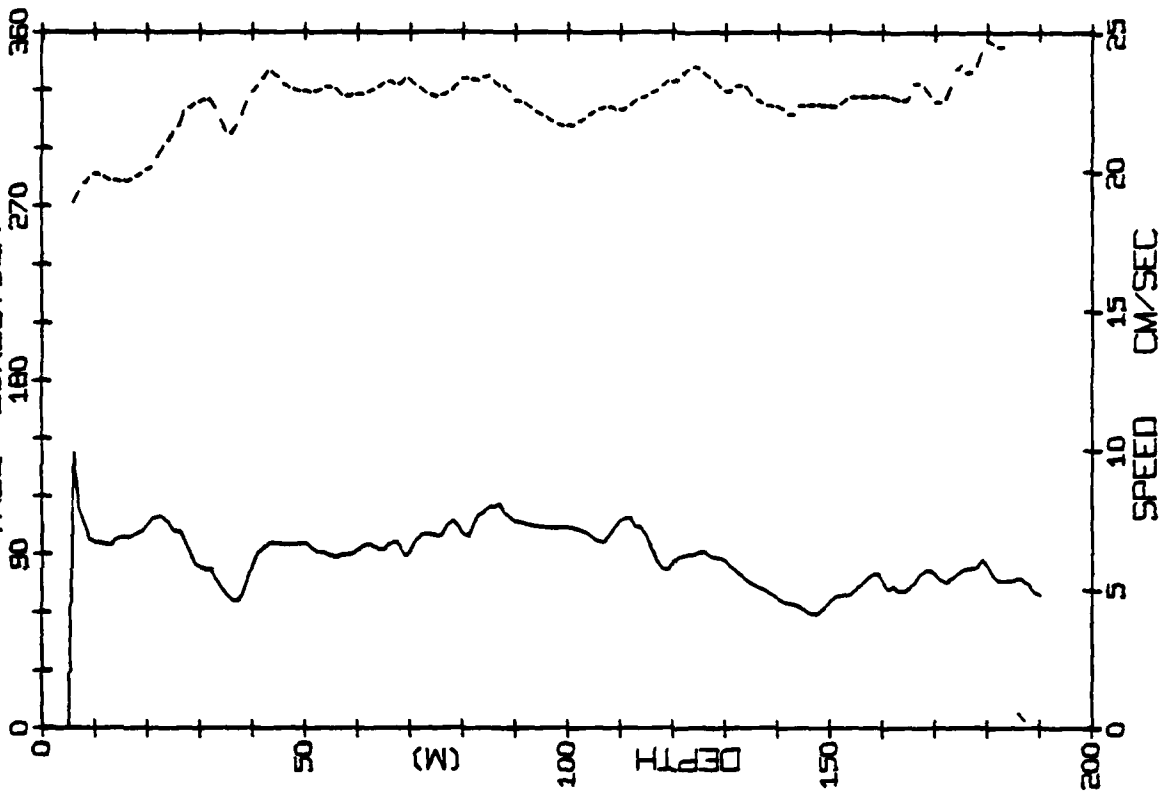
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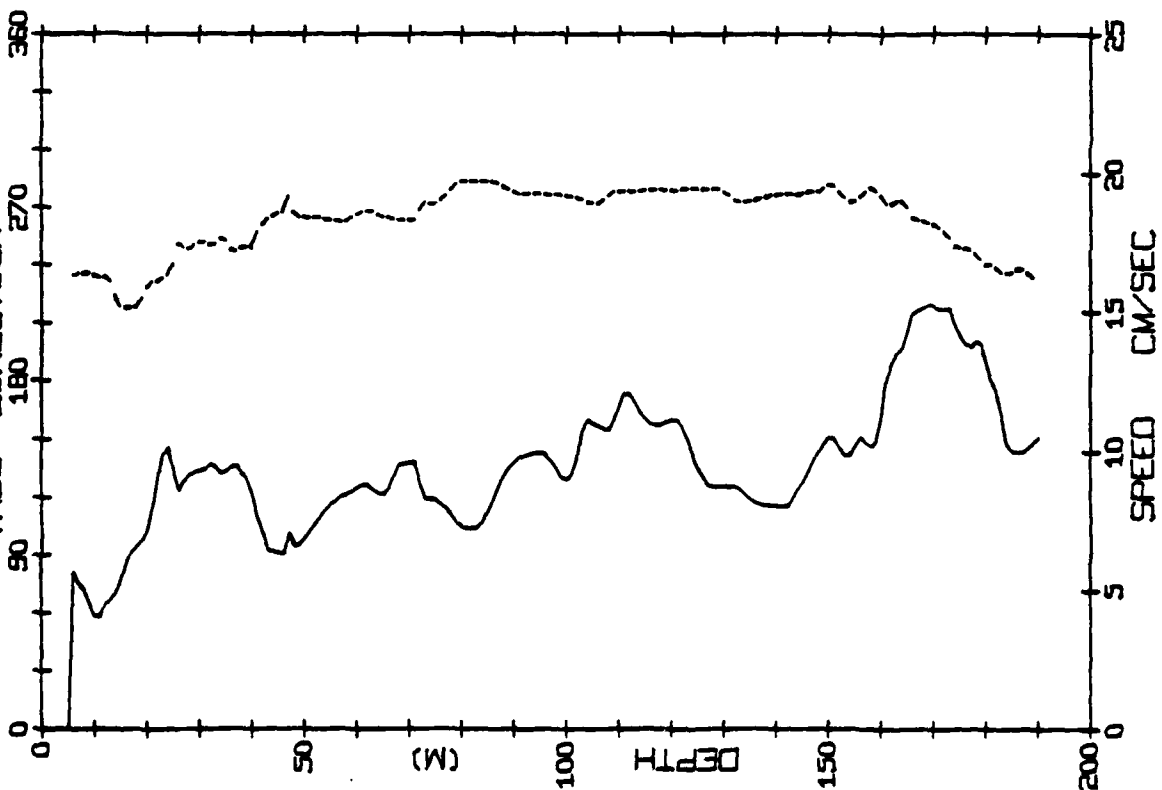
BLUE FOX STATION 210 (100M.) 17/AUG/75 633 GMT
LAT= 74.7601N LONG= 137.0331W LTER= 2. LQER= 4.
NIVEL= -16.6 EIVEL= -10.0 NVER= 0. EVER= 0.



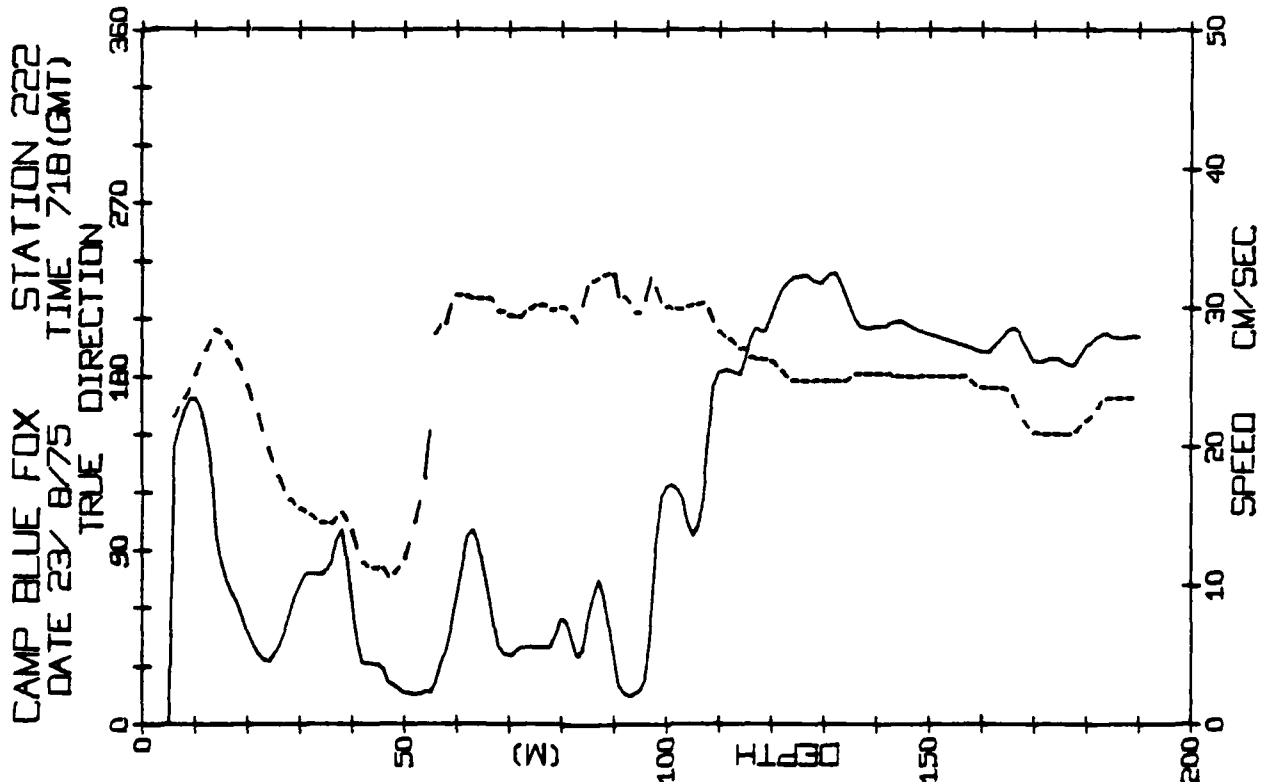
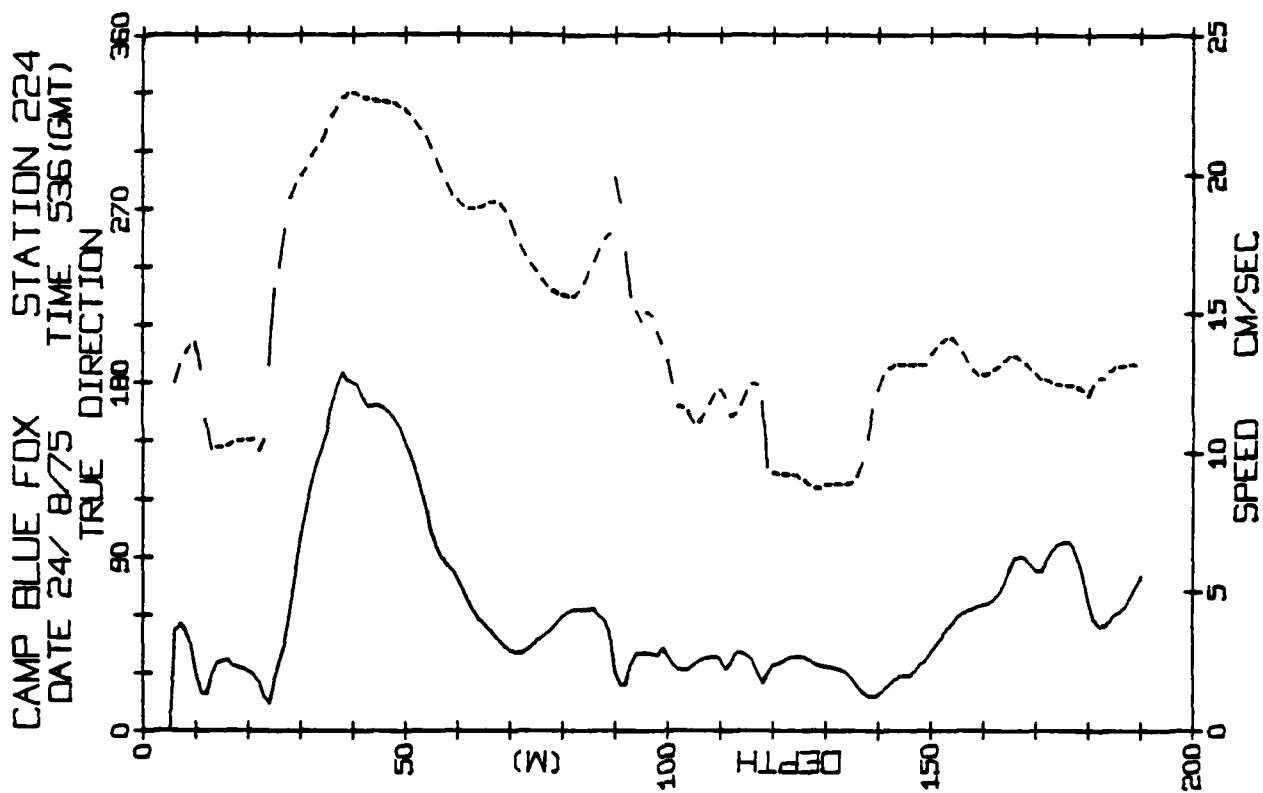
CAMP BLUE FOX STATION 219
 DATE 21/ 8/75 TIME 2118 (GMT)
 TRUE DIRECTION



CAMP BLUE FOX STATION 218
 DATE 21/ 8/75 TIME 521 (GMT)
 TRUE DIRECTION

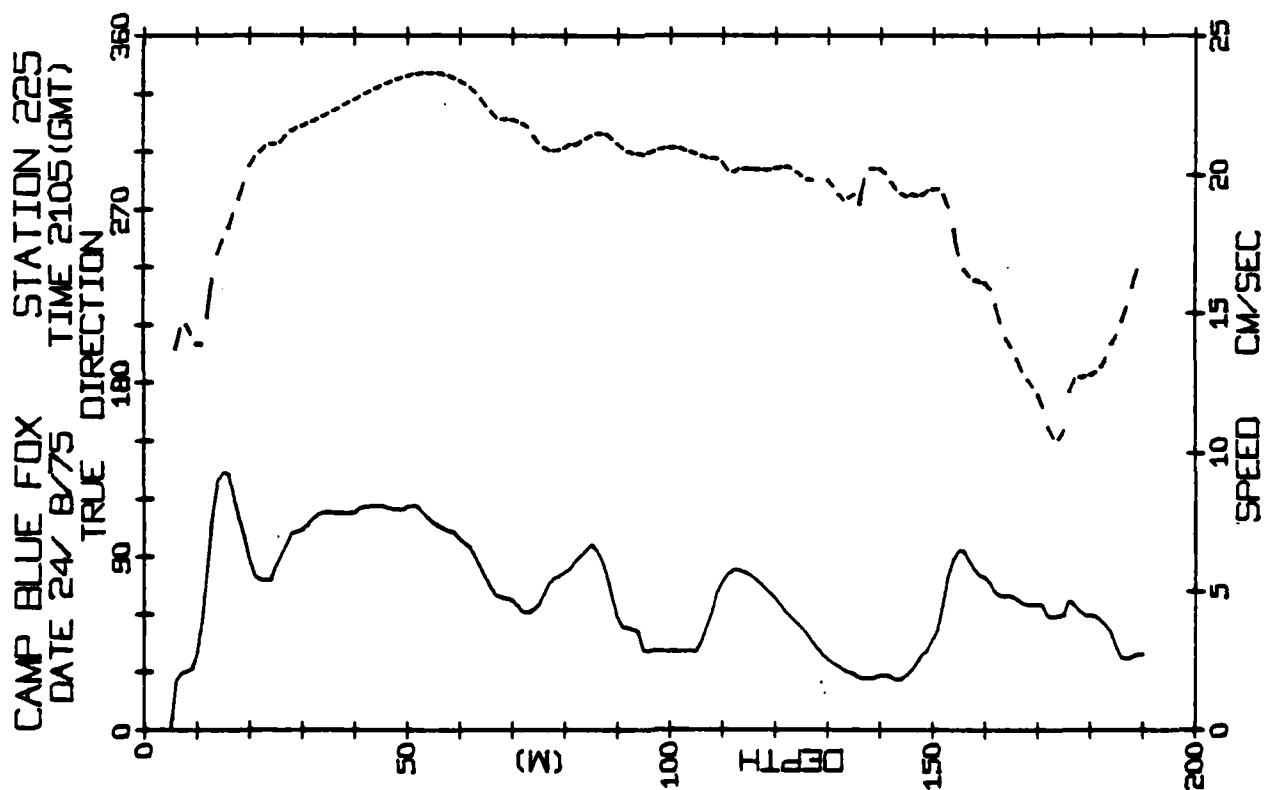
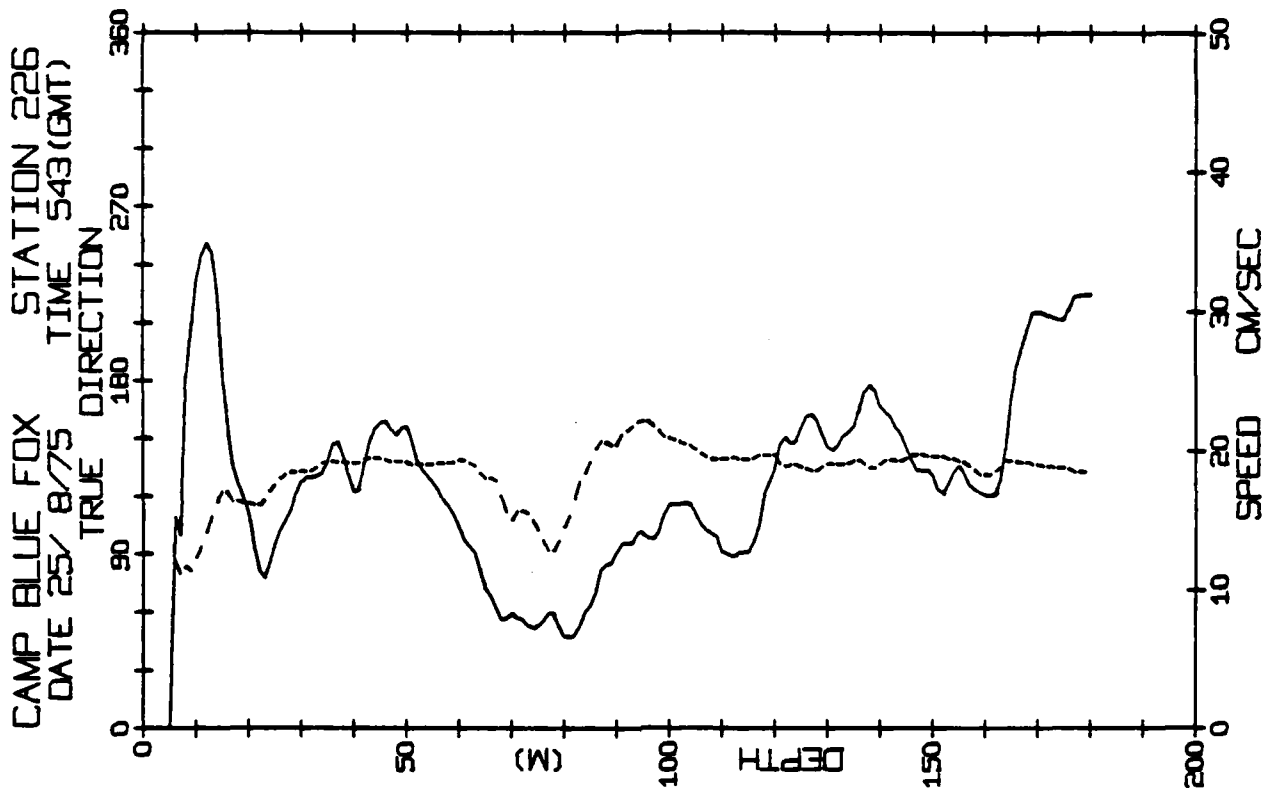


BLUE FOX STATION 218 (190M.) 21/AUG/75 521 GMT
 LAT= 74.6953N LONG= 137.9682W LTER= 2. LGER= 4.
 NIVEL= -2.5 EIVEL= -10.9 NVER= 0. EVER= 0.



BLUE FOX STATION 222 (190M.) 23/AUG/75 718 GMT
LAT= 74.6298N LONG= 138.1742W LTER= 1. LOER= 2.
NINVEL= -15.7 EIVEL= 0.6 NVER= 0. EVER= 0.

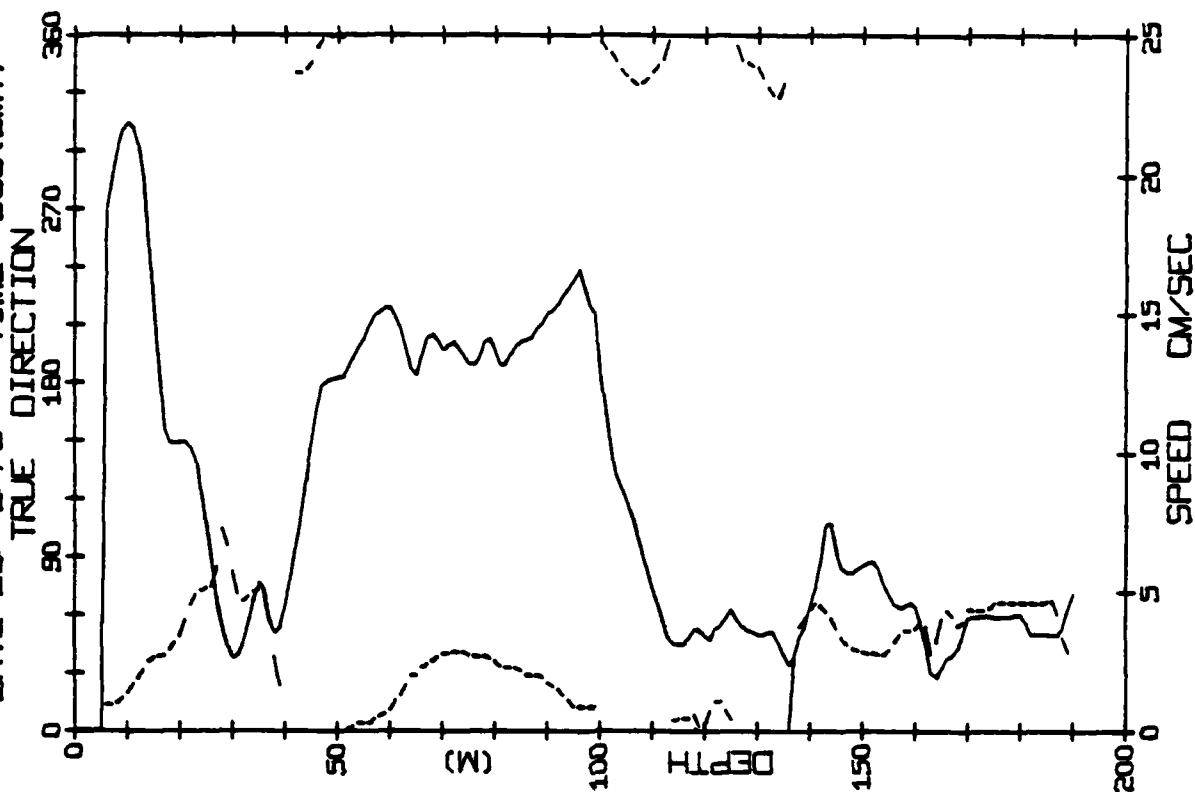
[illegible][illegible]



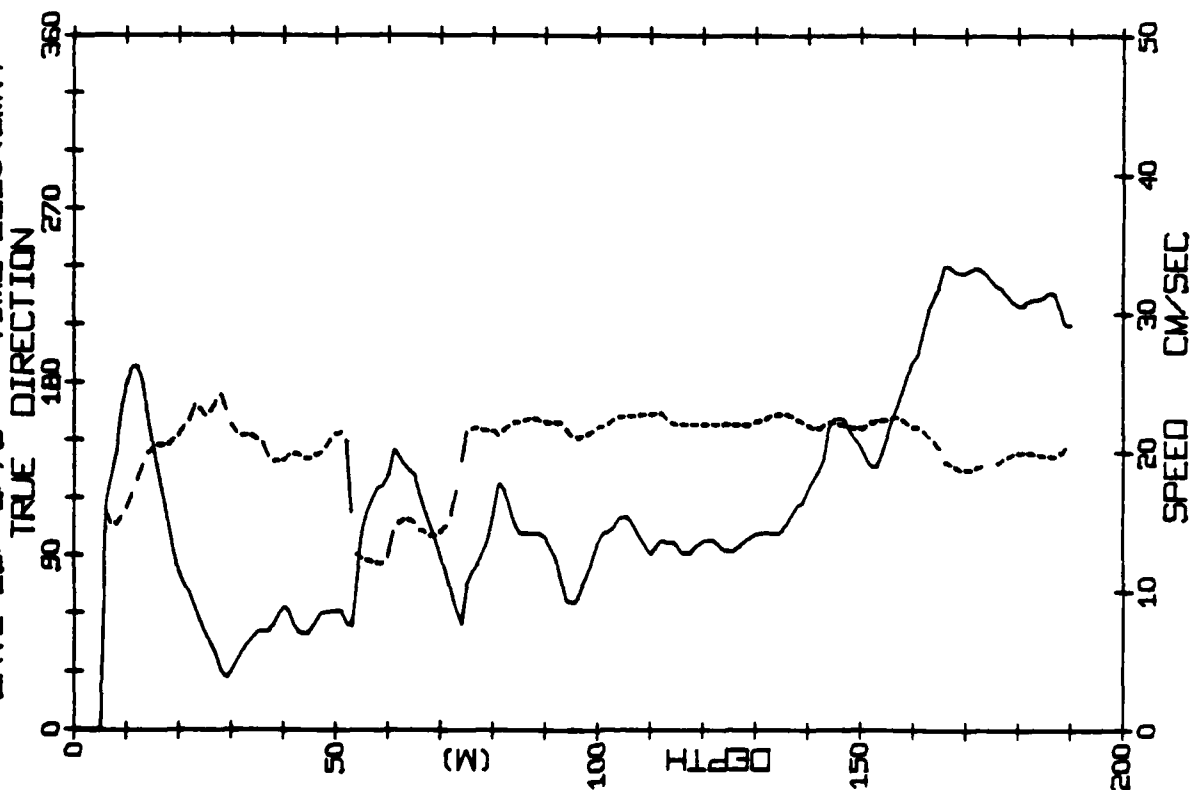
BLUE FOX STATION 225 (190M.) 24/AUG/75 2105 GMT
 LAT= 74.5945N LONG= 138.2083W LTER= 2. LOER= 4.
 NIVEL= 0.0 EIVEL= -0.7 NVER= 0. EVER= 0.

[illegible][illegible]

CAMP BLUE FOX STATION 228
DATE 26/ 8/75 TIME 536 (GMT)



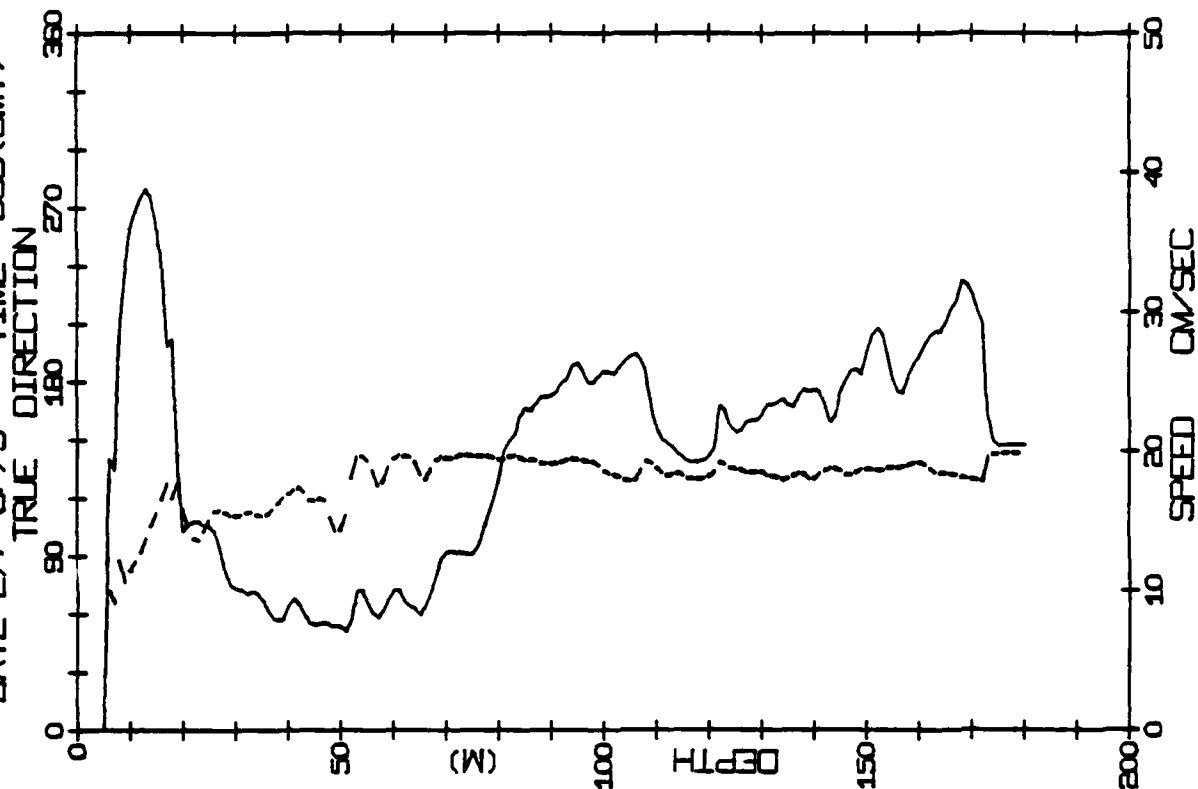
CAMP BLUE FOX STATION 227
DATE 25/ 8/75 TIME 2110 (GMT)



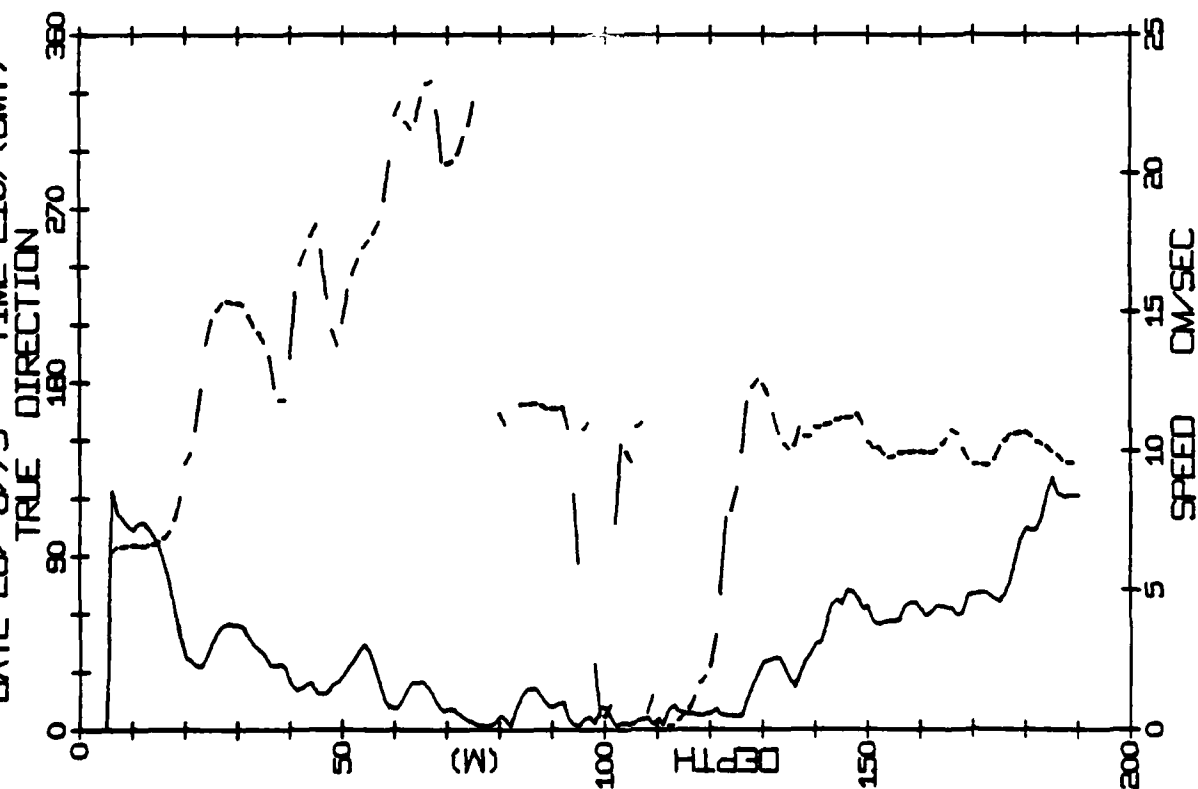
BLUE FOX STATION 227 (190M.) 23/AUG/75 2110 GMT
LAT= 74.5680N LONG= 137.8807W LTER= 0. LGER= 0.
NIVEL= -11.3 EIVEL= 15.1 NVER= 0. EVER= 0.

[illegible]

CAMP BLUE FOX STATION 230
DATE 27/ 8/75 TIME 539(GMT)



CAMP BLUE FOX STATION 229
DATE 26/ 8/75 TIME 2107(GMT)

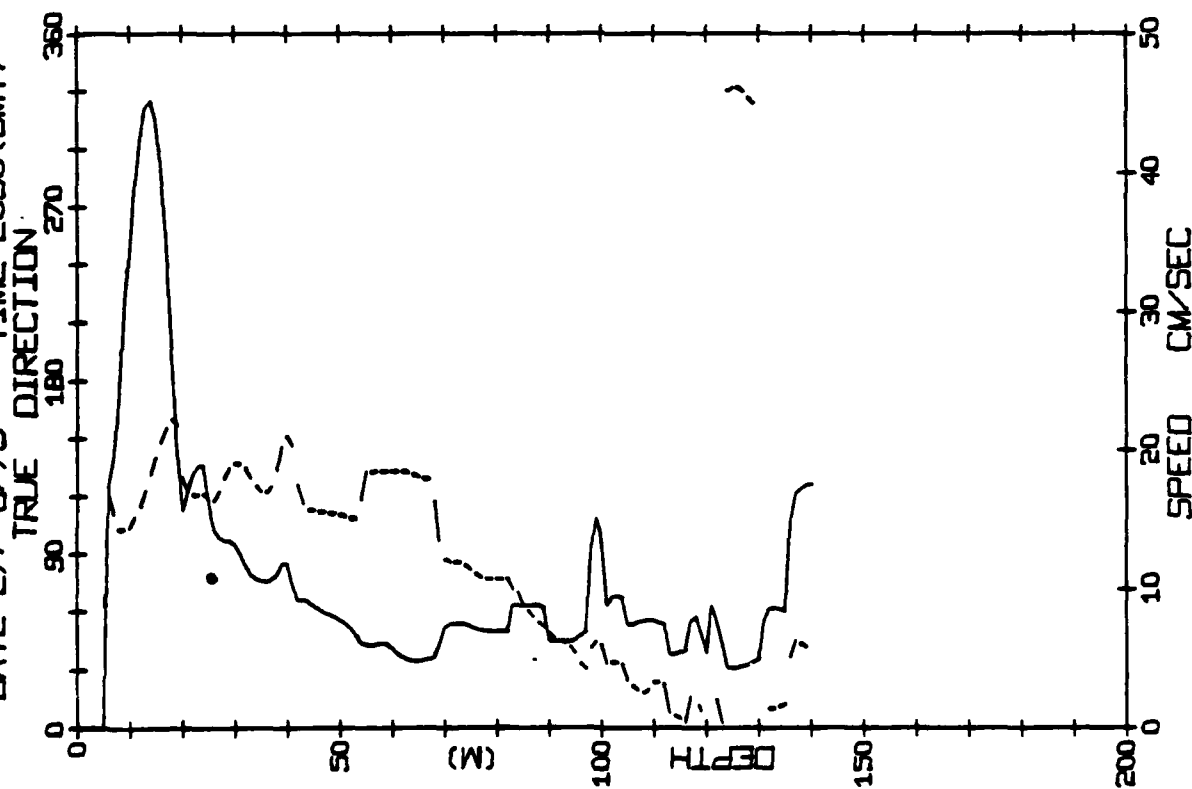


BLUE FOX STATION 229 (190M.) 26/AUG/75 2107 GMT
 LAT= 74.6072N LONG= 137.8625W LTER= 2 LOER= 3.
 NIVEL= 0.9 EIVEL= 14.1 NVER= 0. EVER= 0.

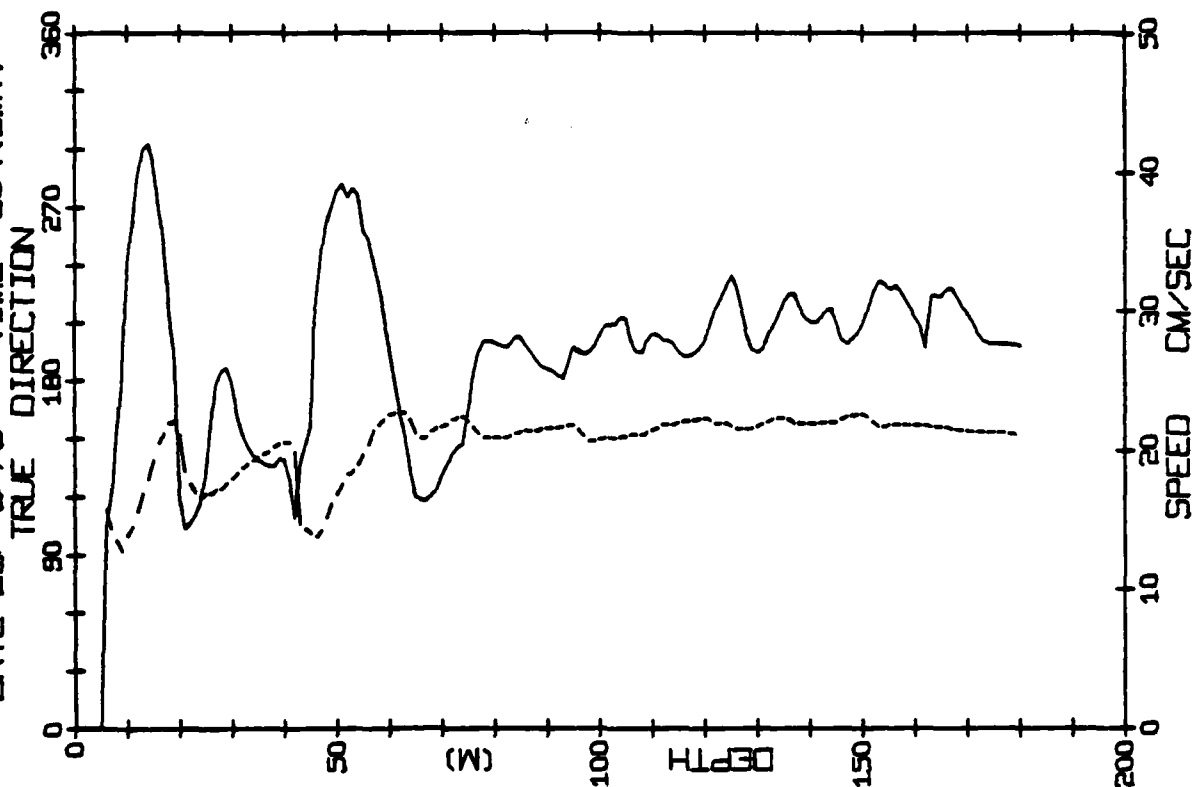
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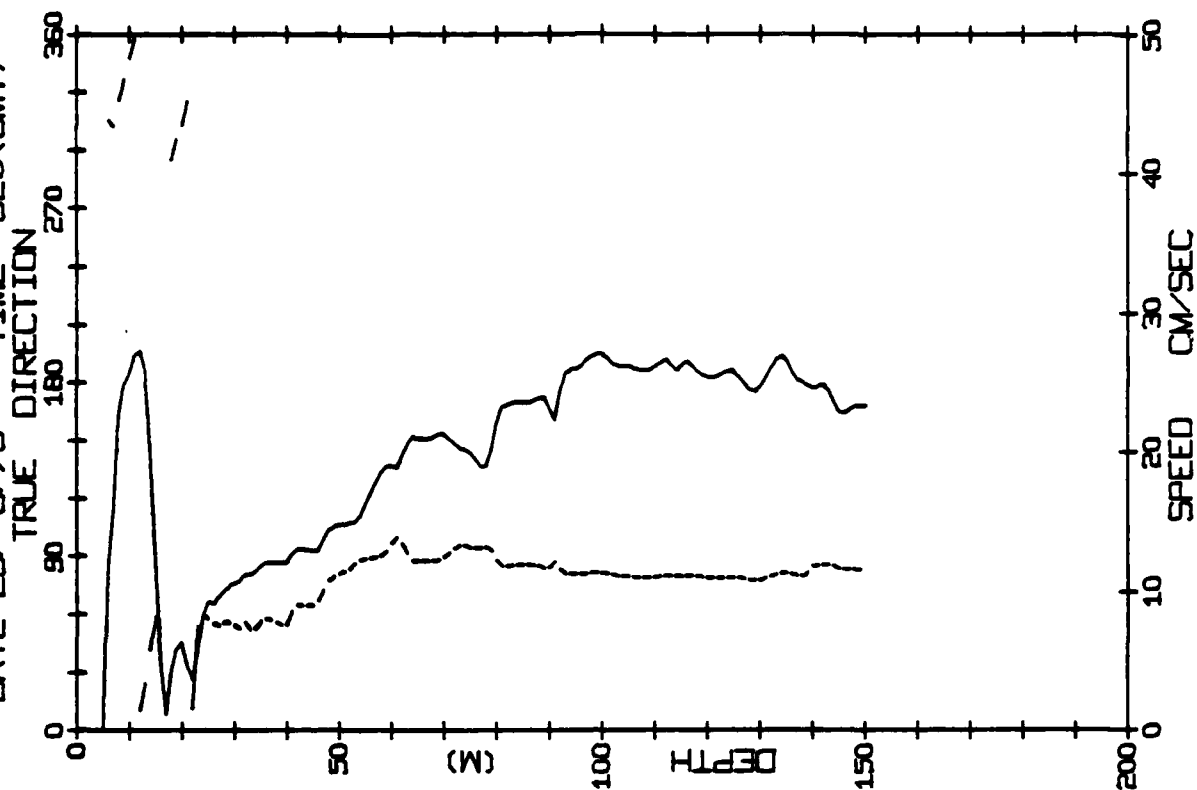
CAMP BLUE FOX STATION 231
DATE 27/ 8/75 TIME 2050(GMT)



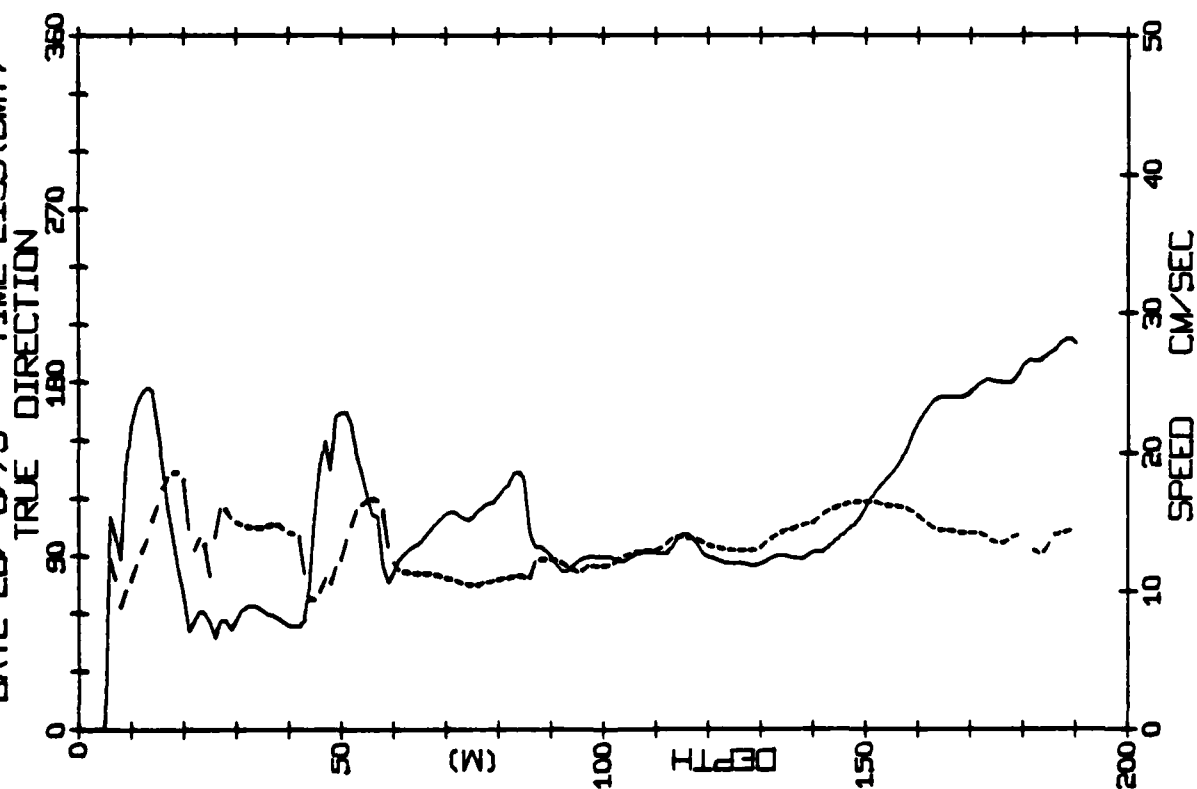
CAMP BLUE FOX STATION 232
DATE 28/ 8/75 TIME 604(GMT)



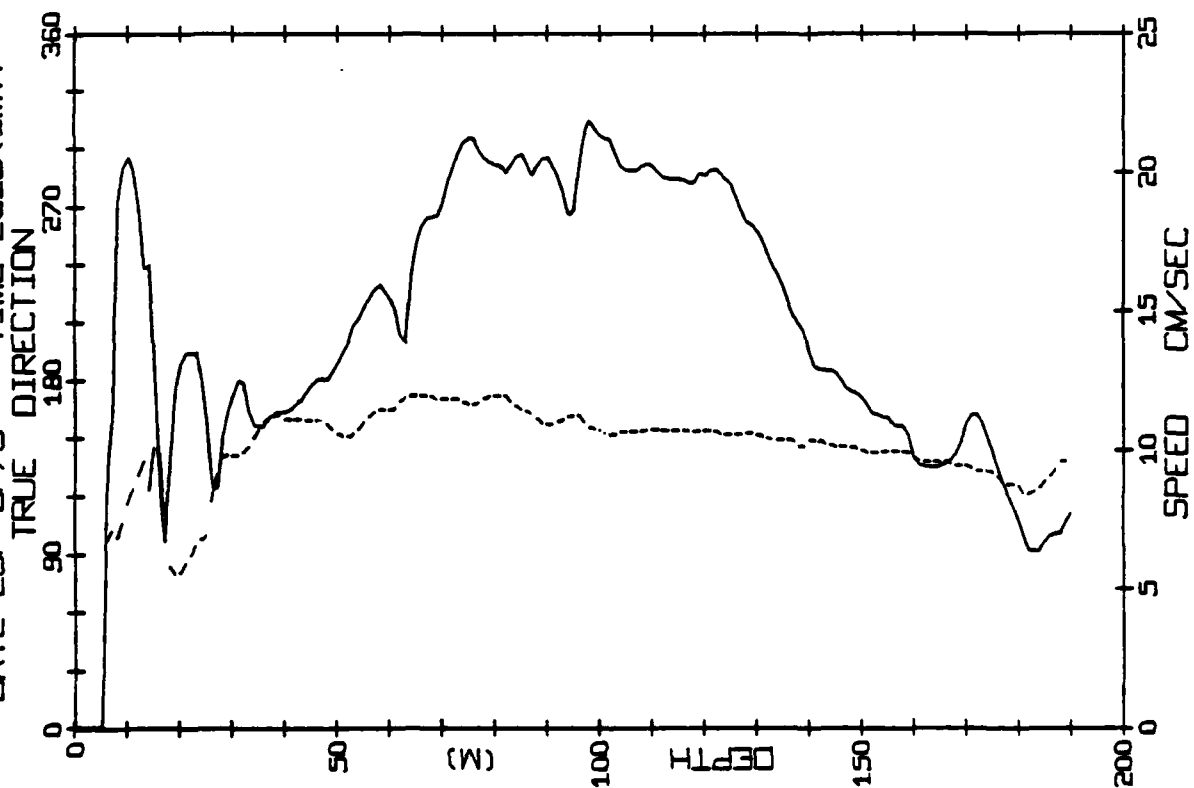
CAMP BLUE FOX STATION 234
DATE 29/ 8/75 TIME 520(GMT)



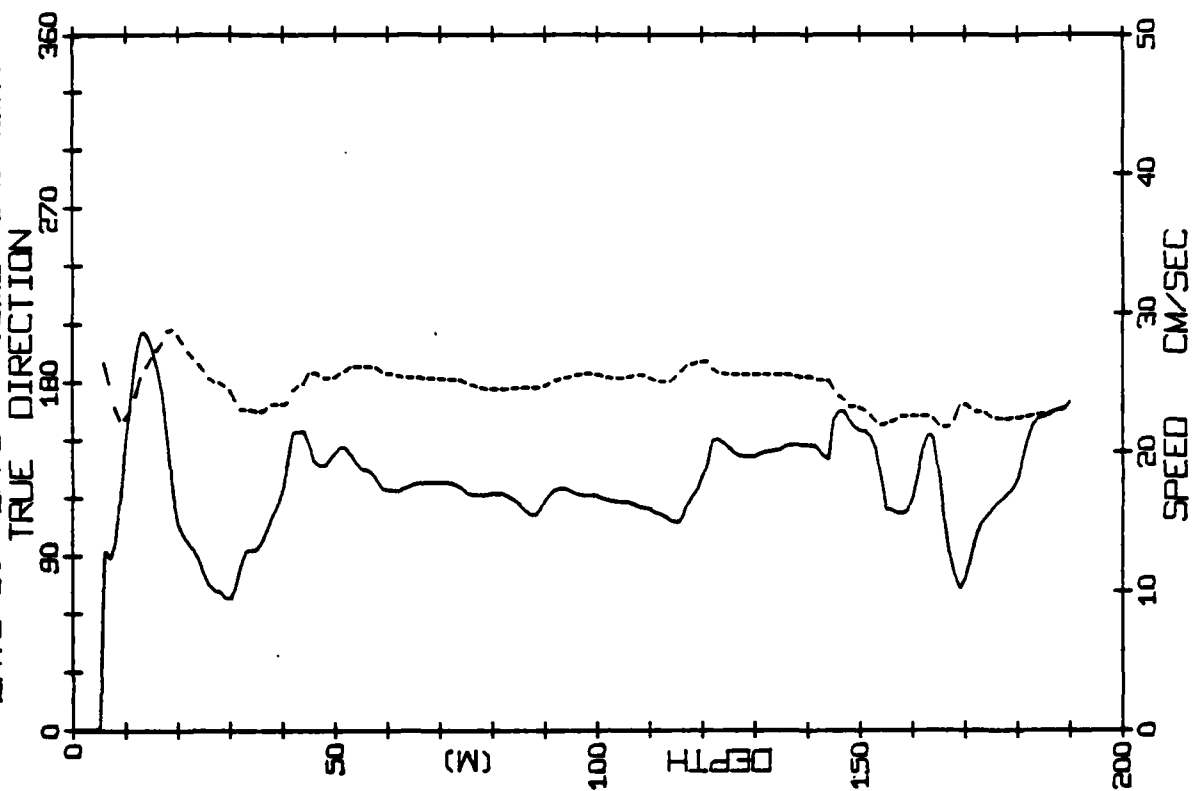
CAMP BLUE FOX STATION 233
DATE 28/ 8/75 TIME 2139(GMT)



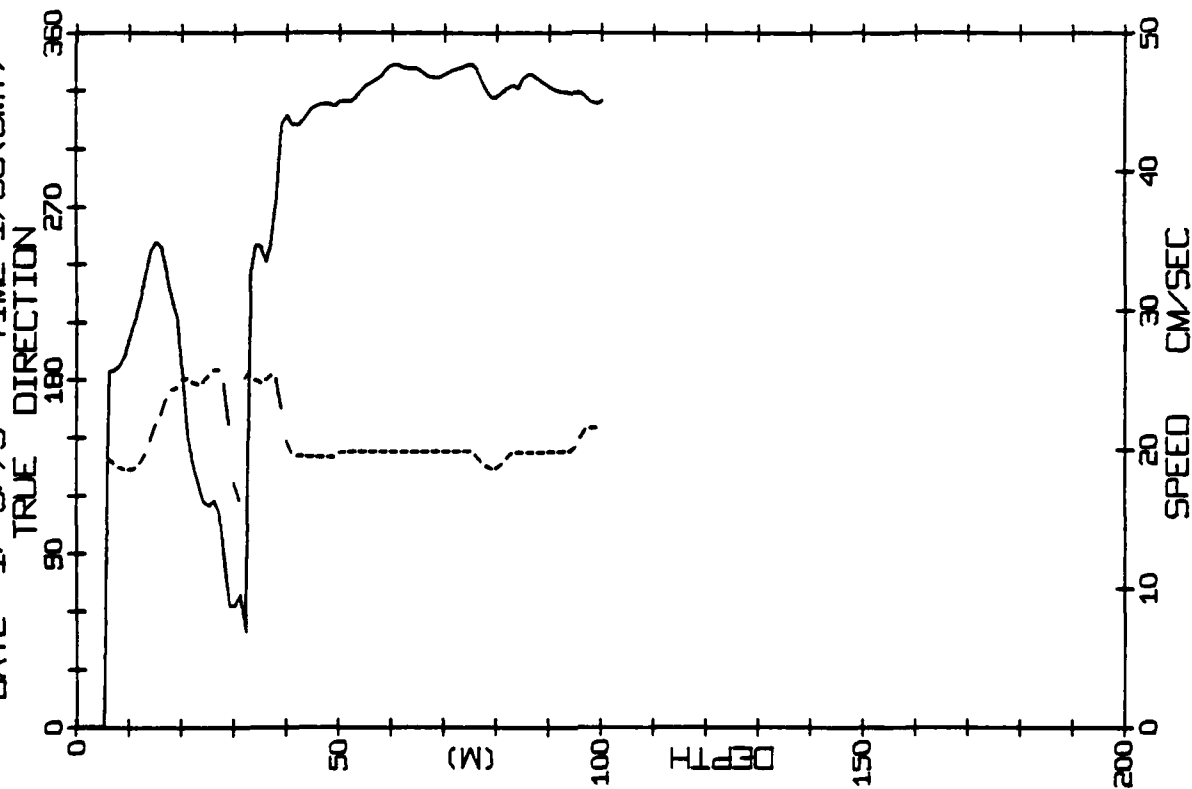
CAMP BLUE FOX STATION 235
DATE 29/ 8/75 TIME 2319(GMT)



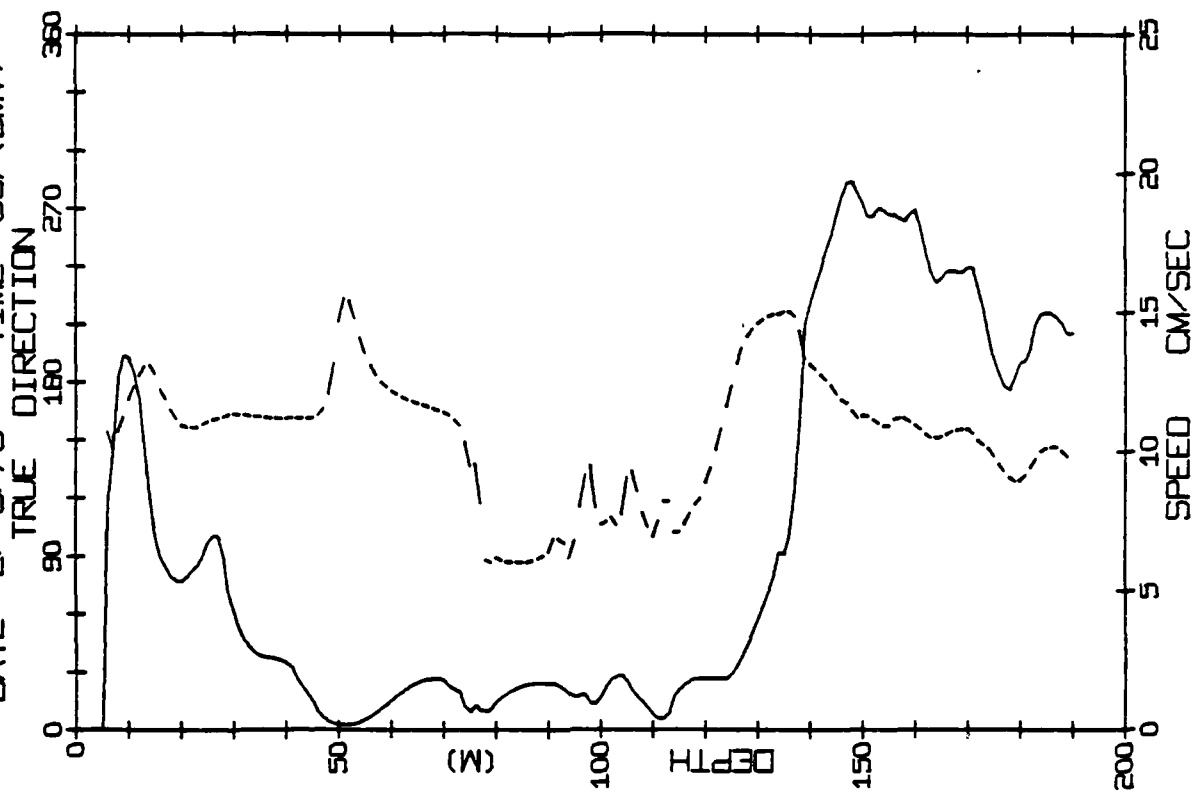
CAMP BLUE FOX STATION 236
DATE 30/ 8/75 TIME 549(GMT)



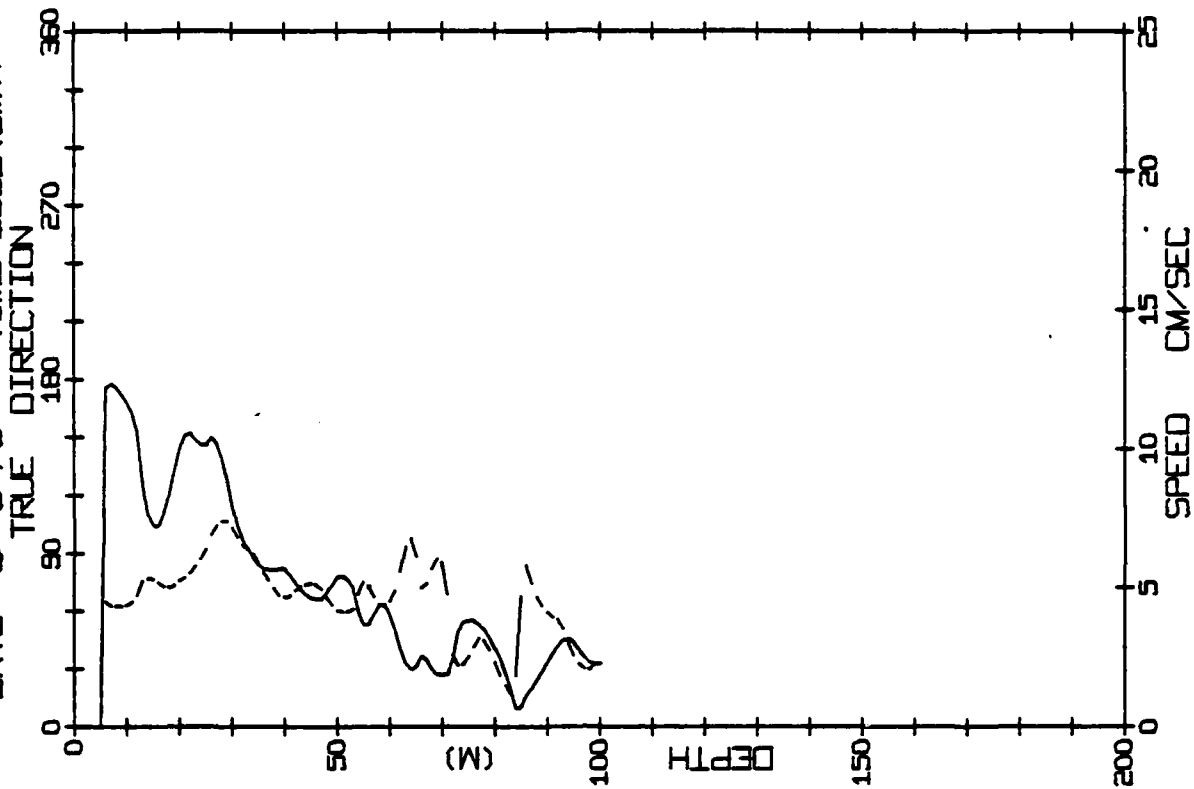
CAMP BLUE FOX STATION 241
DATE 1/9/75 TIME 1756(GMT)



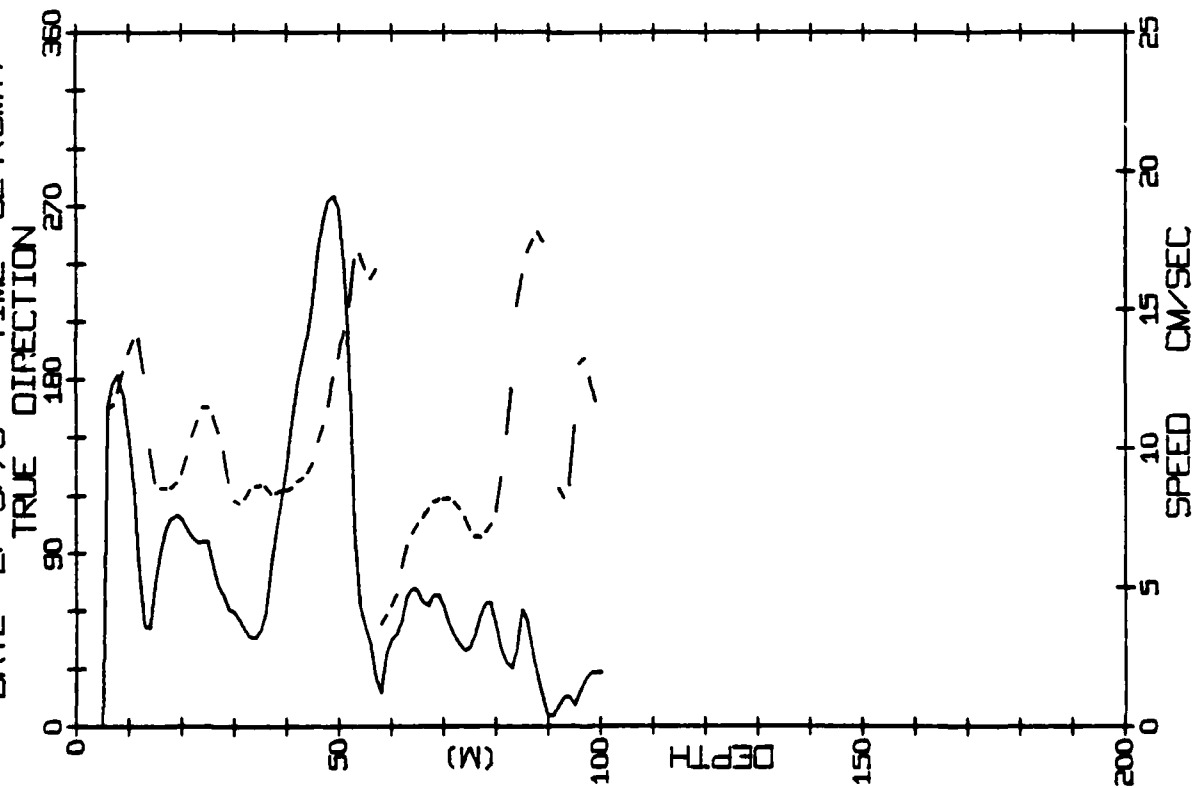
CAMP BLUE FOX STATION 243
DATE 2/9/75 TIME 537(GMT)



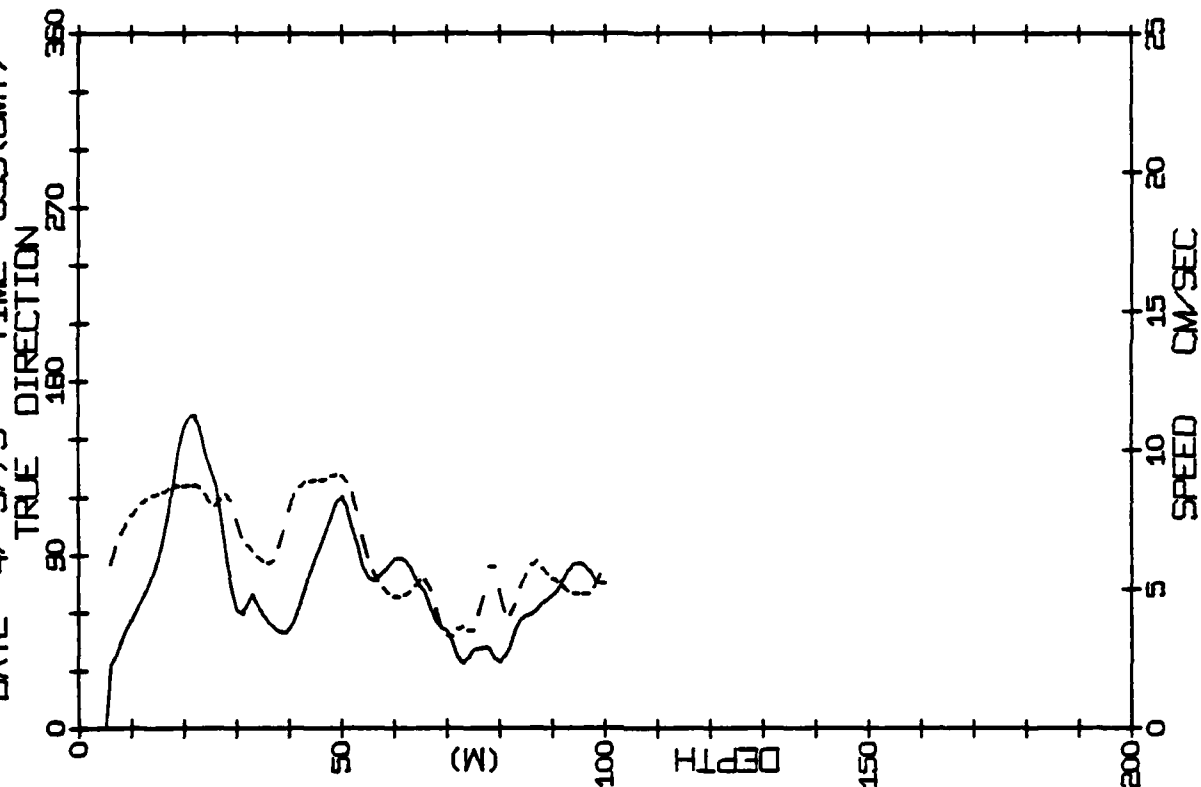
CAMP BLUE FOX STATION 247
 DATE 3/9/75 TIME 1652(GMT)



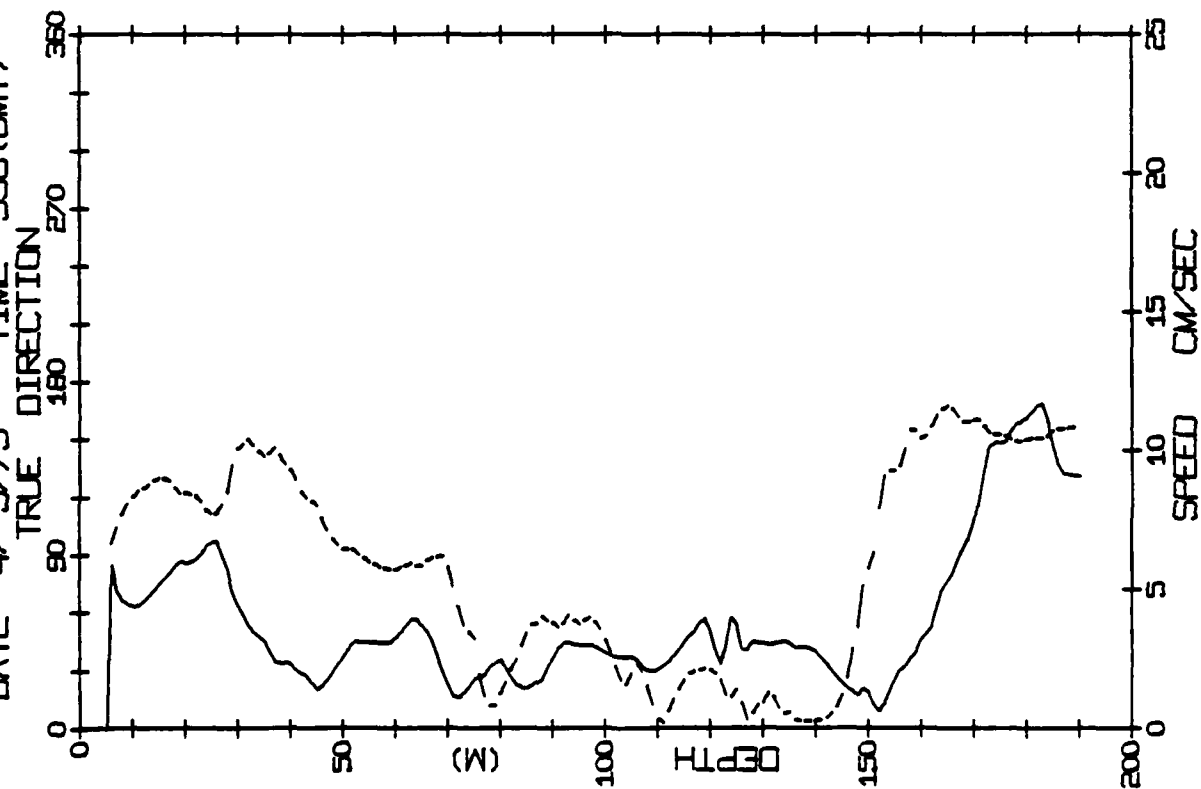
CAMP BLUE FOX STATION 244
 DATE 2/9/75 TIME 624(GMT)



CAMP BLUE FOX STATION 250
DATE 4/9/75 TIME 639(GMT)



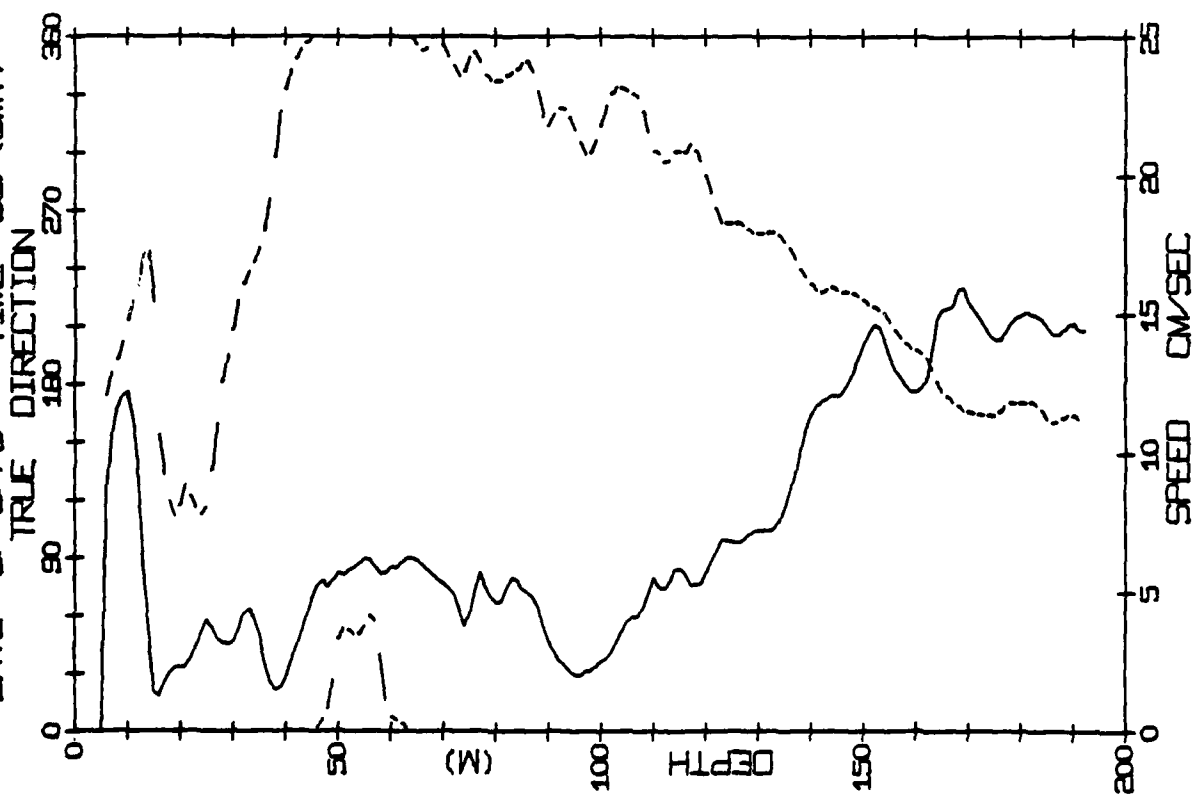
CAMP BLUE FOX STATION 249
DATE 4/9/75 TIME 536(GMT)



BLUE FOX STATION 249 (190M.) 4/SEP/75 536 GMT
LAT= 74.0232N LONG= 136.1387W LTER= 1. LOER= 1.
NIVEL= -1.4 EIVEL= 8.2 NVER= 0. EVER= 0.

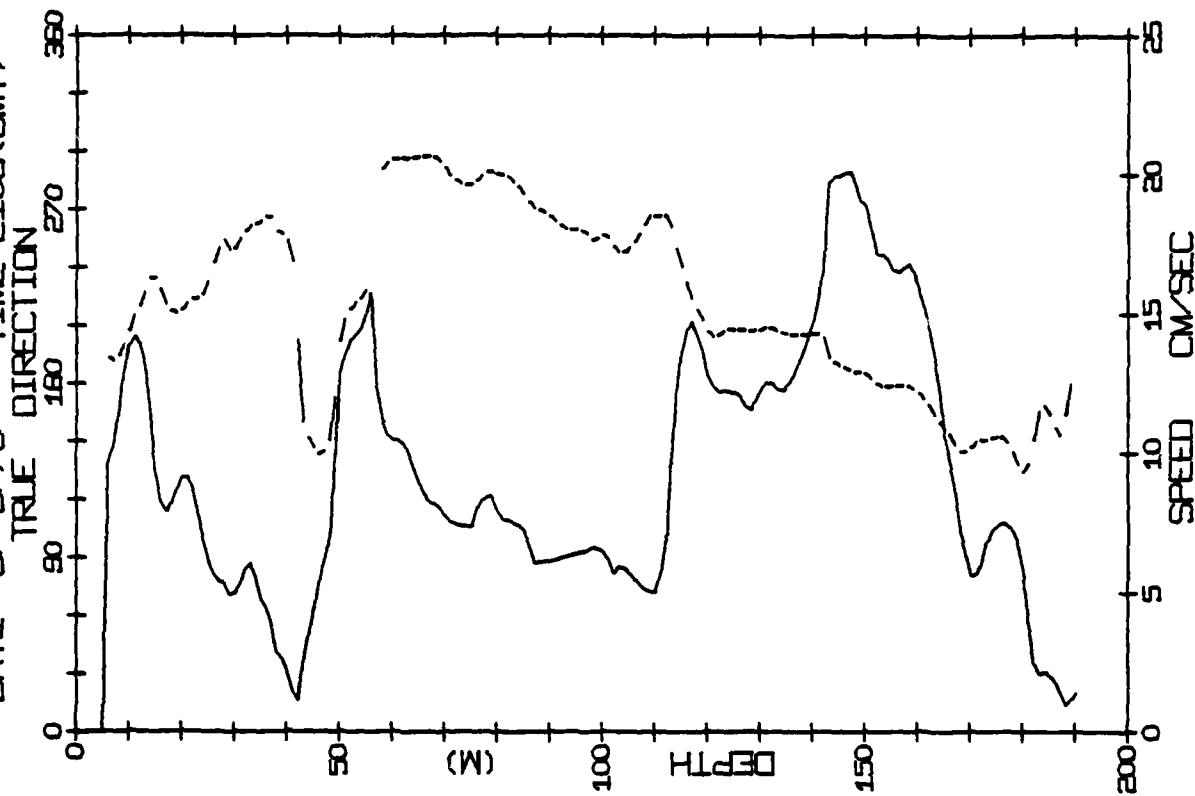
[illegible][illegible]

CAMP BLUE FOX STATION 252
DATE 5/9/75 TIME 537 (GMT)



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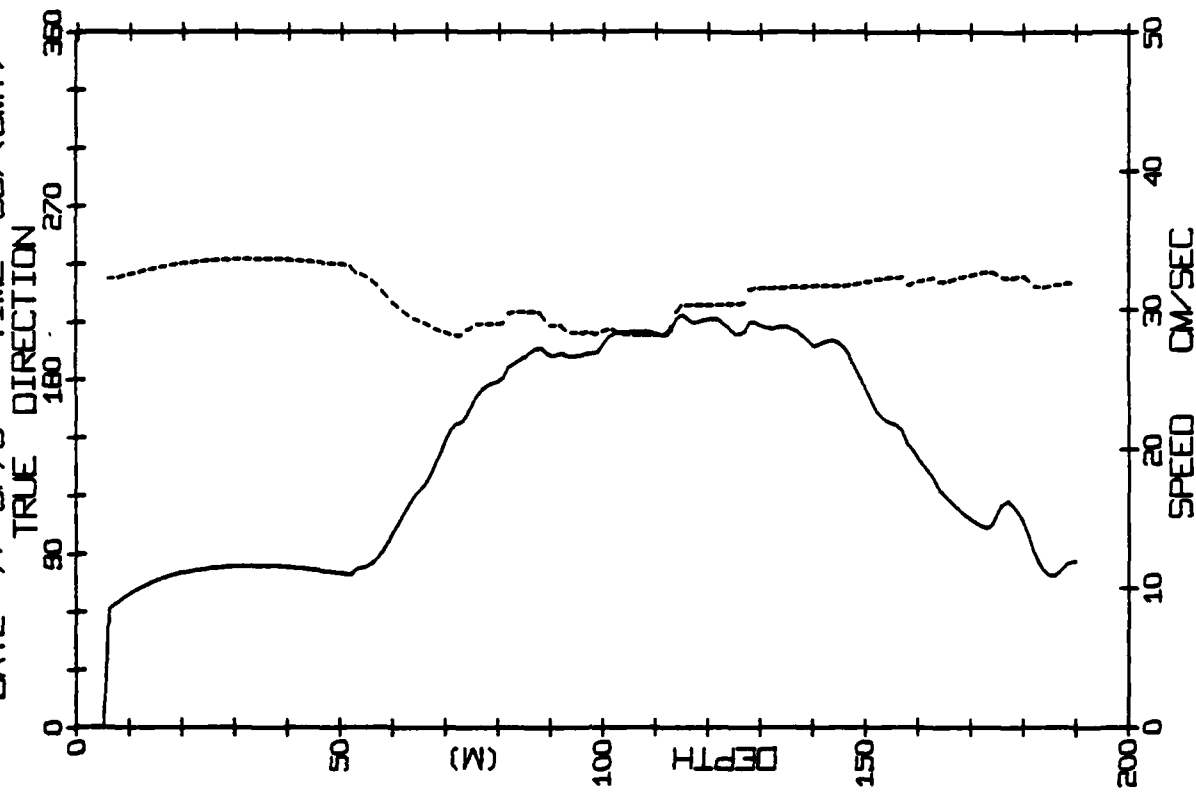
CAMP BLUE FOX STATION 253
DATE 5/9/75 TIME 2108 (GMT)



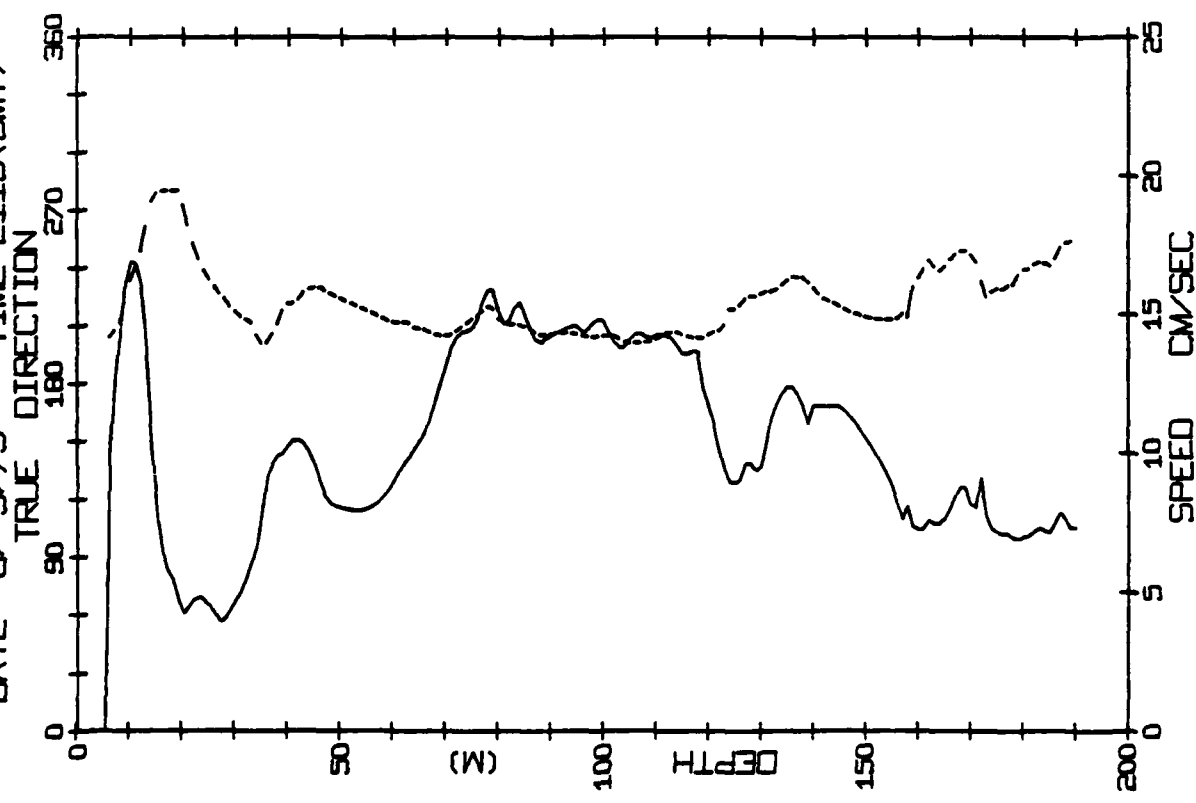
BLUE FOX STATION 252 (192M.) 5/SEP/75 537 GHT
LAT= 74.0275N LONG= 136.0871W LTER= 378. LOER= 478.
NIVEL= -7.2 EIVEL= -2.3 NVER= 5. EVER= 5.

[illegible][illegible]

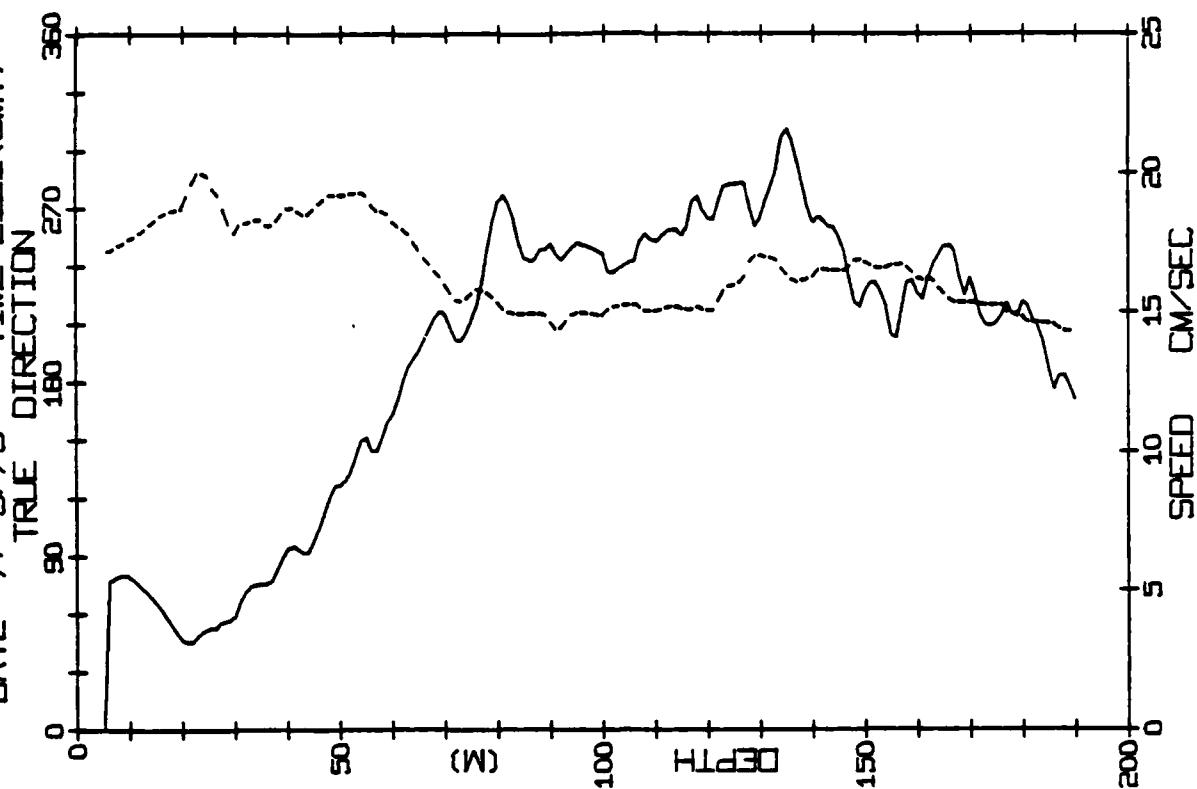
CAMP BLUE FOX STATION 256
 DATE 7/9/75 TIME 557 (GMT)



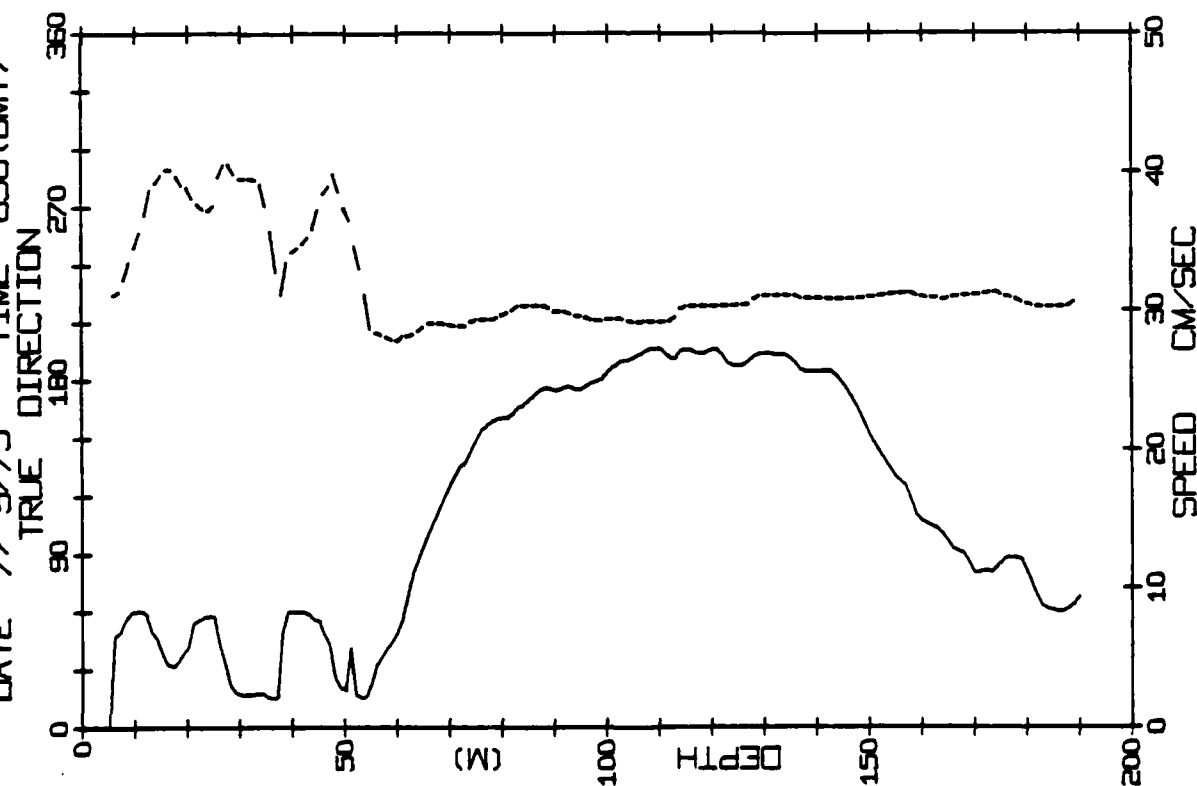
CAMP BLUE FOX STATION 255
 DATE 6/9/75 TIME 2119 (GMT)



CAMP BLUE FOX STATION 258
DATE 7/9/75 TIME 2121 (GMT)



CAMP BLUE FOX STATION 257
DATE 7/9/75 TIME 656 (GMT)



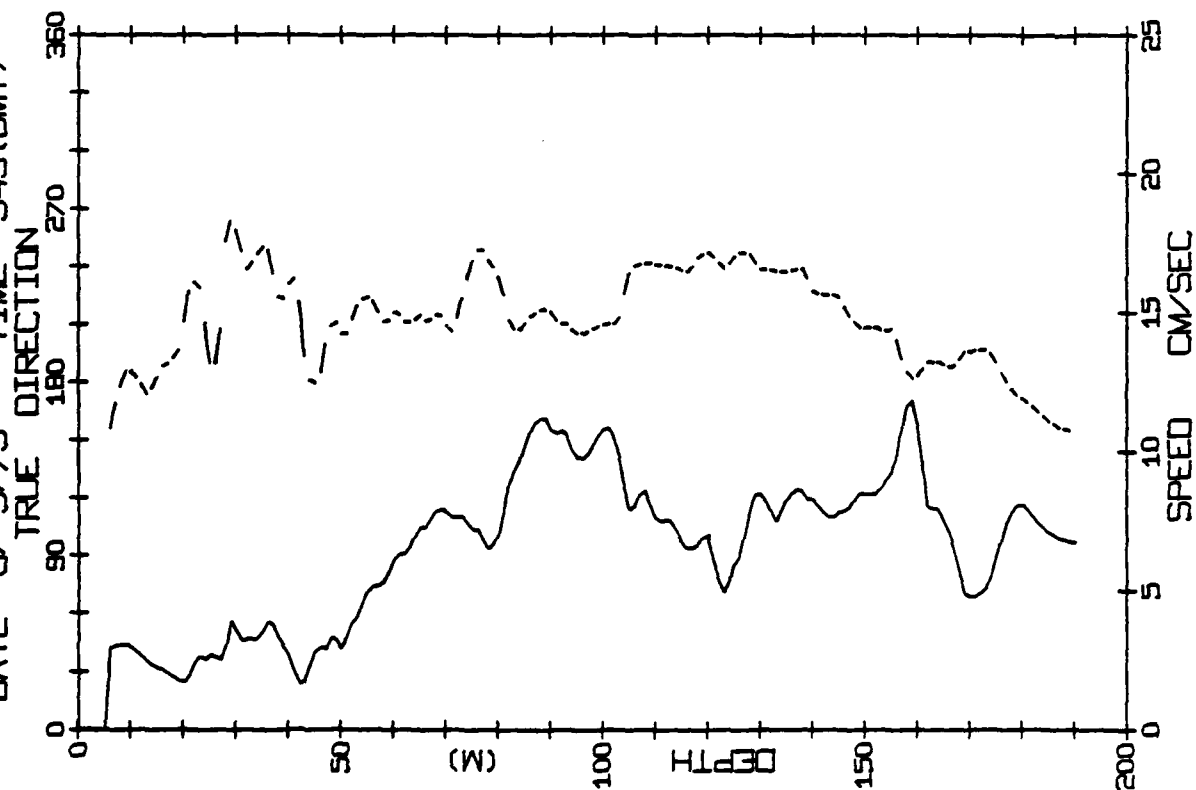

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08BLUE FOX STATION 257 (190M.) 7/SEP/75 656 GMT
LAT= 73.8842N LONG= 136.4094W LTER= 2. LGER= 4.
NIVEL= -1.6 EIVEL= -4.9 NVER= 0. EVER= 0.

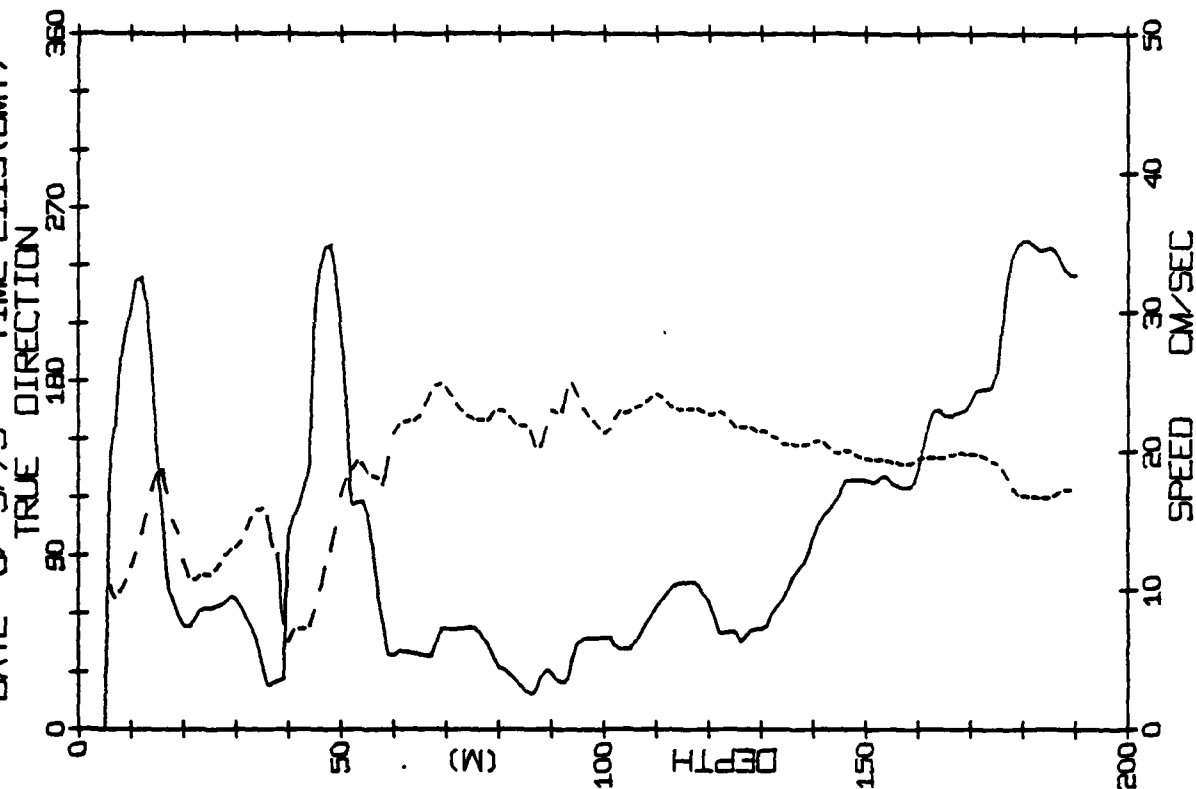
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[illegible][illegible][illegible]

CAMP BLUE FOX STATION 259
DATE 8/9/75 TIME 543(GMT)

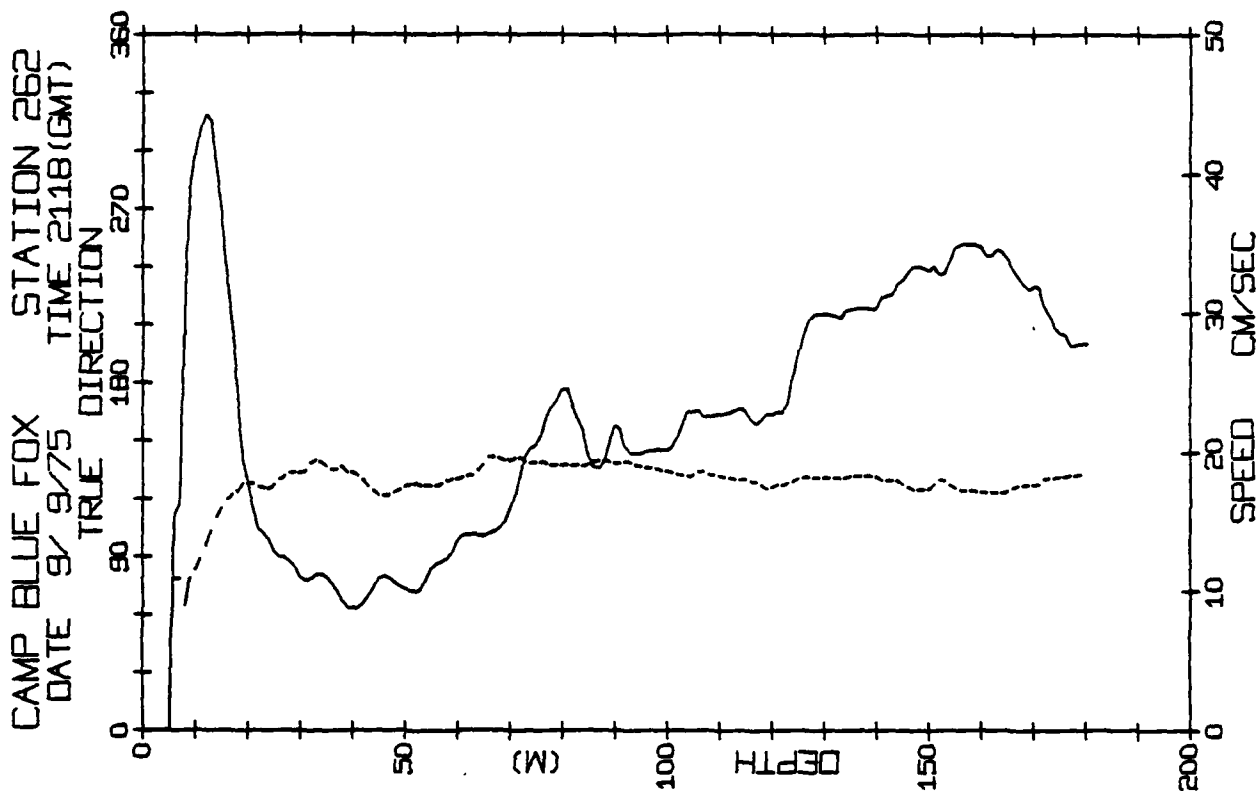
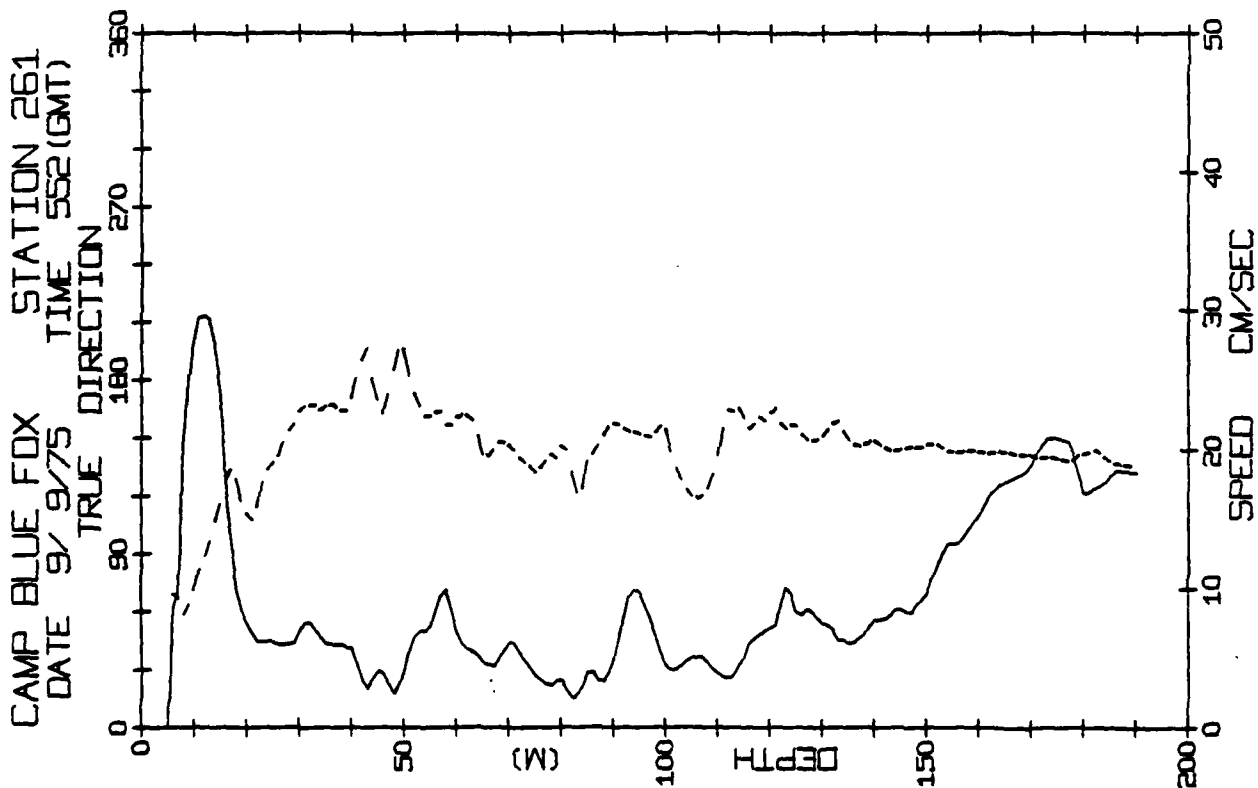


CAMP BLUE FOX STATION 260
DATE 8/9/75 TIME 2113(GMT)

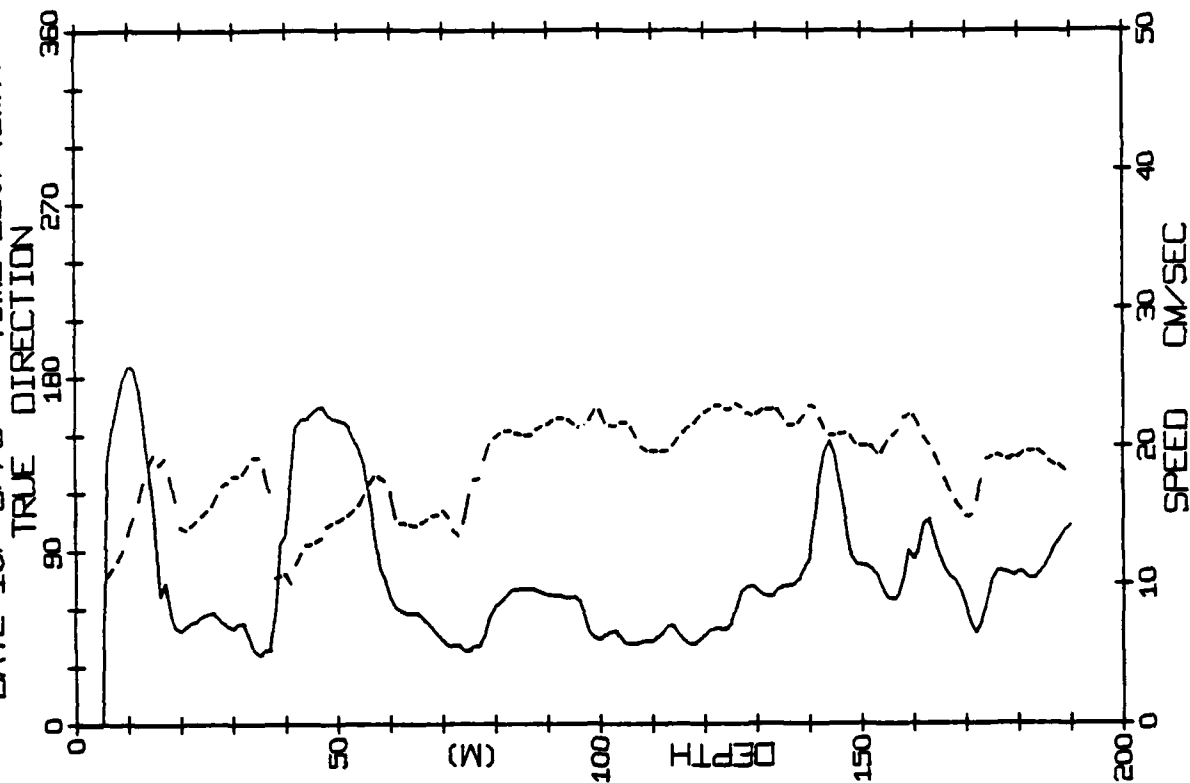


BLUE FOX STATION 259 (190M.) 8/SEP/75 543 GMT
 LAT= 73.8503N LONG= 136.4412W LTER= 2. LOER= 3.
 NIVEL= 0.2 EIVEL= 8.1 NVER= 0. EVER= 0.

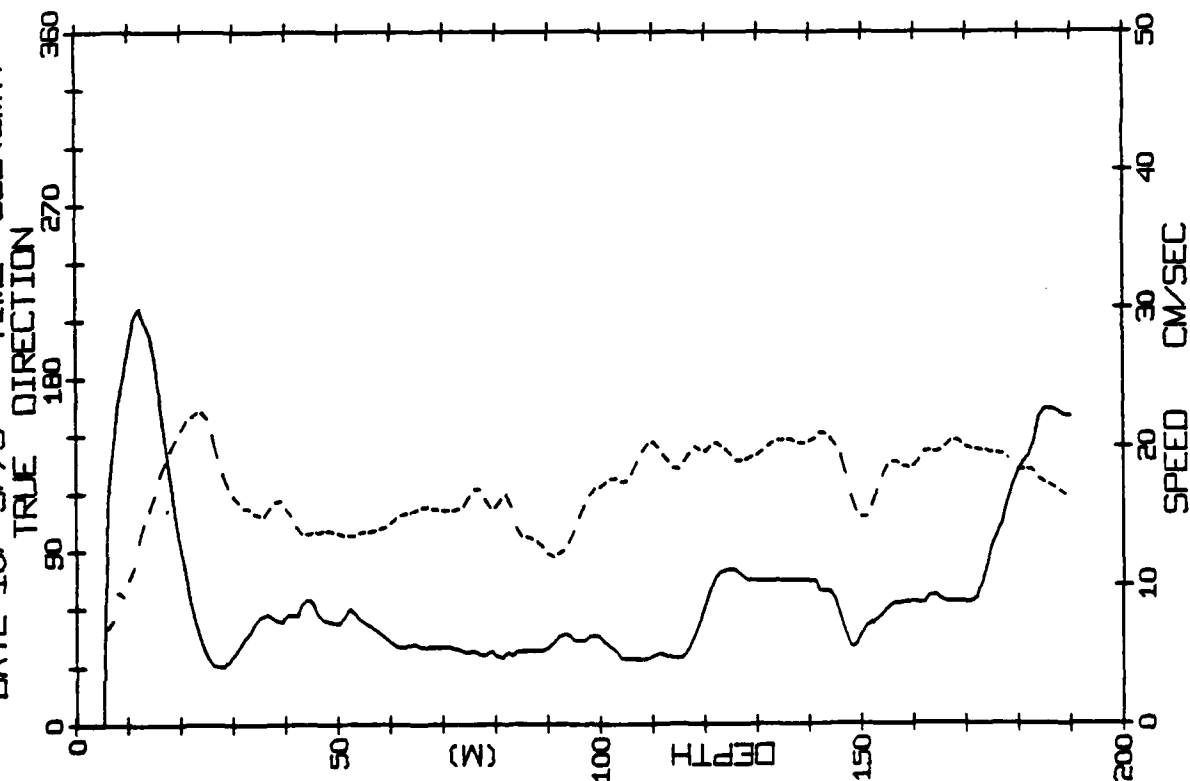
[illegible][illegible]

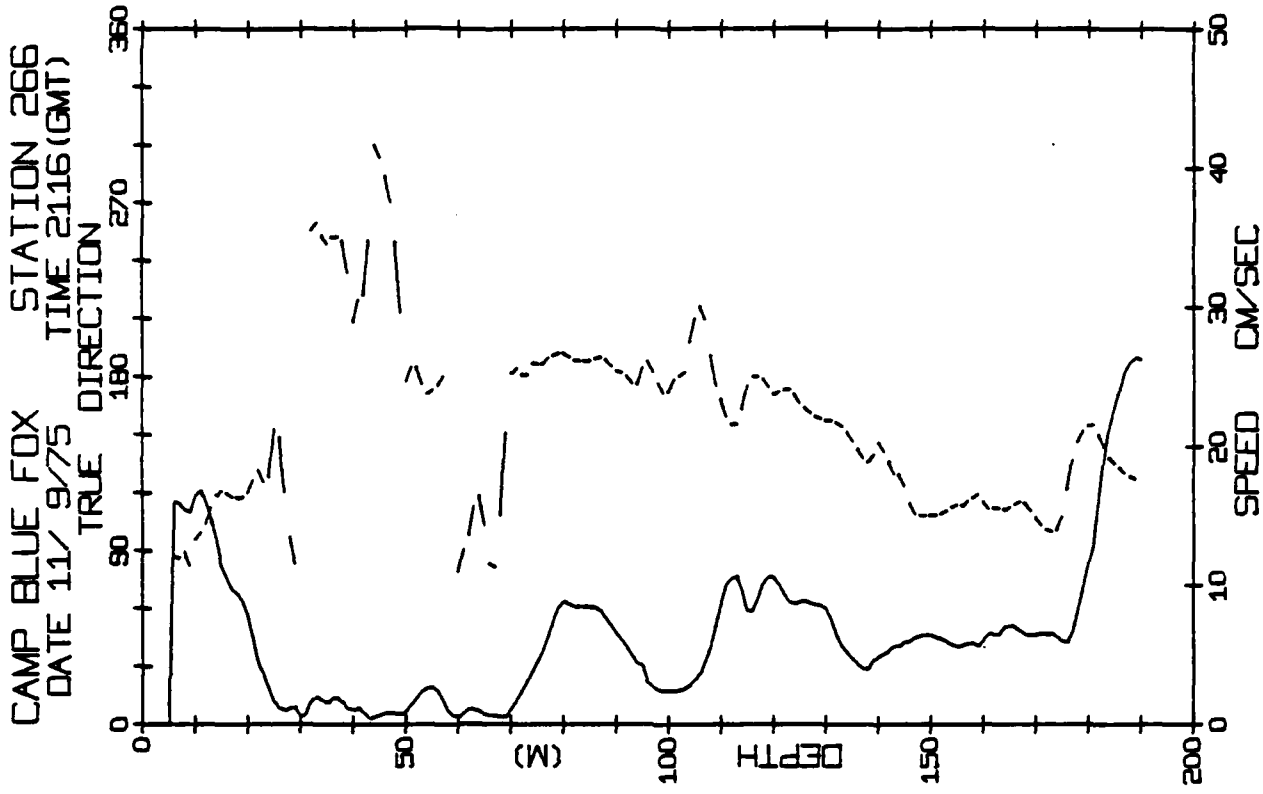
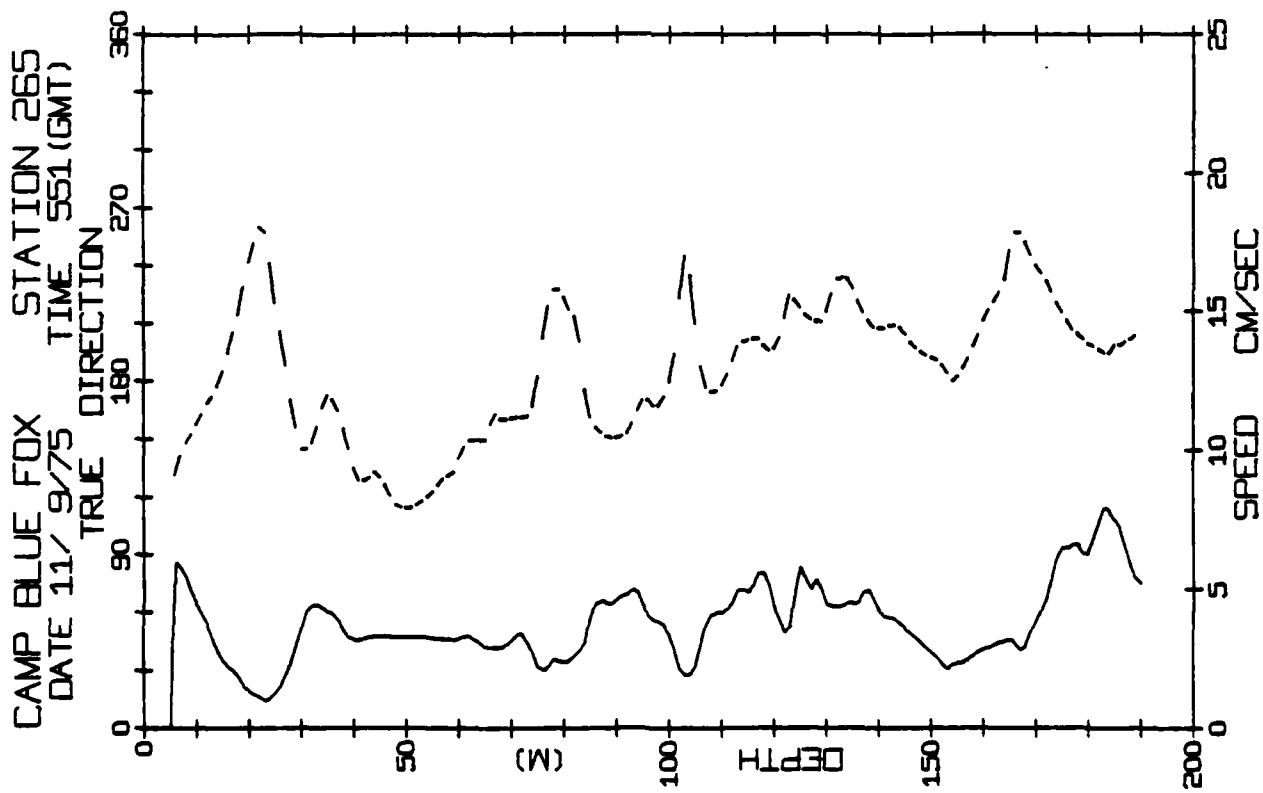


CAMP BLUE FOX STATION 264
DATE 10/ 9/75 TIME 2107 (GMT)



CAMP BLUE FOX STATION 263
DATE 10/ 9/75 TIME 552 (GMT)



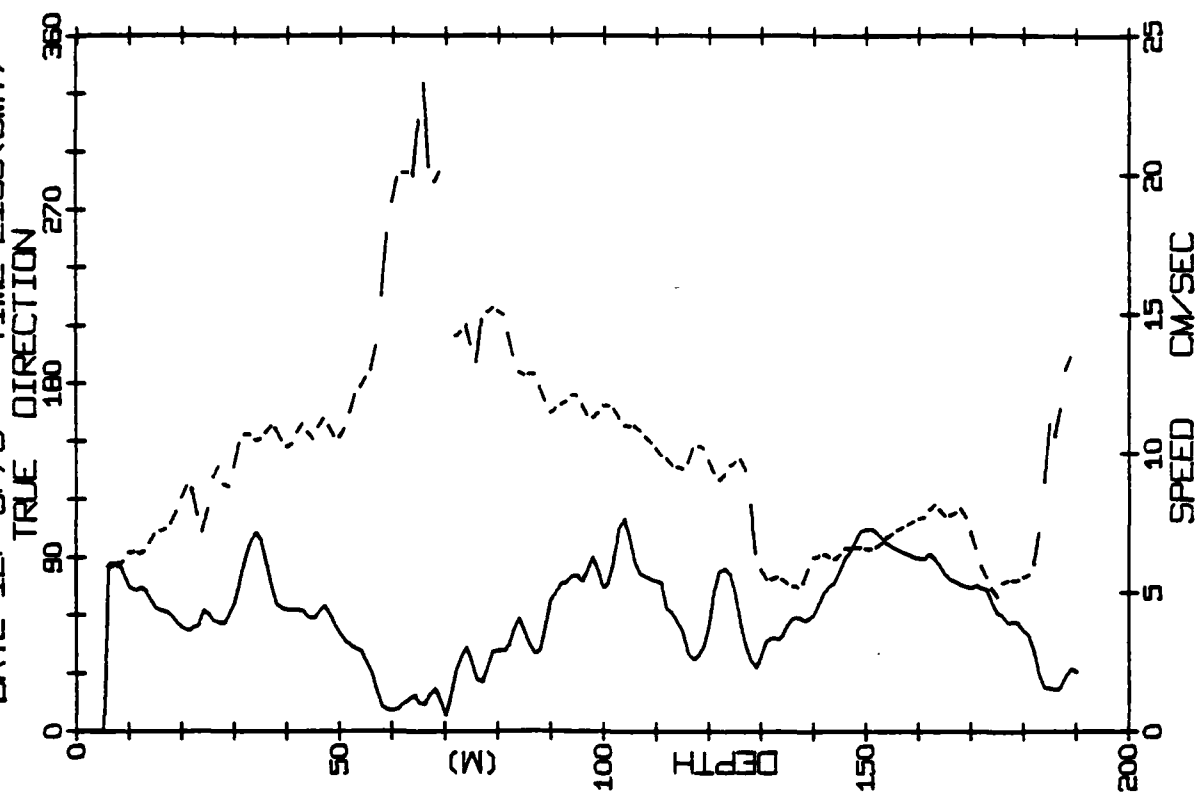


BLUE FOX STATION 265 (190M.) 11/SEP/73 551 GMT
 LAT= 73.812N LONG= 135.2023W LTER= 20. LOER= 40.
 NINVEL= 2.6 EIVEL= 5.4 NVER= 0. EVER= 1.

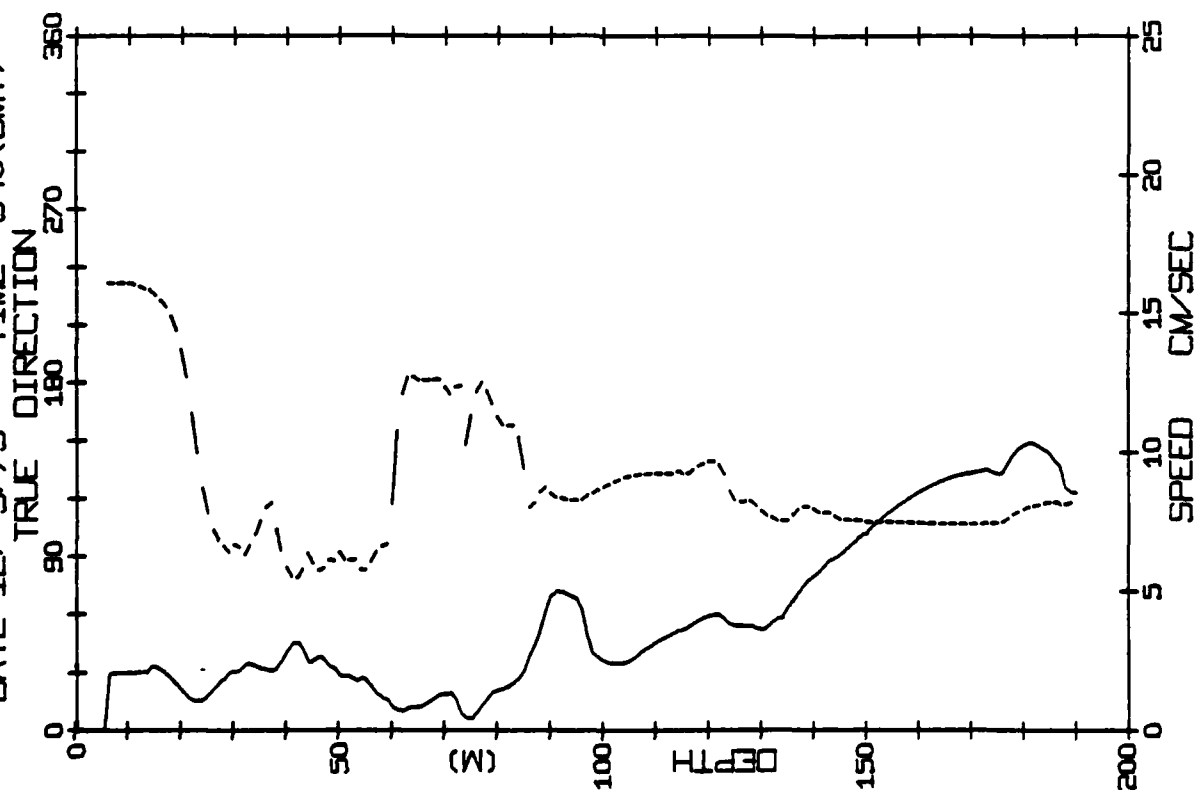
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CAMP BLUE FOX STATION 268
DATE 12/ 9/75 TIME 2133(GMT)

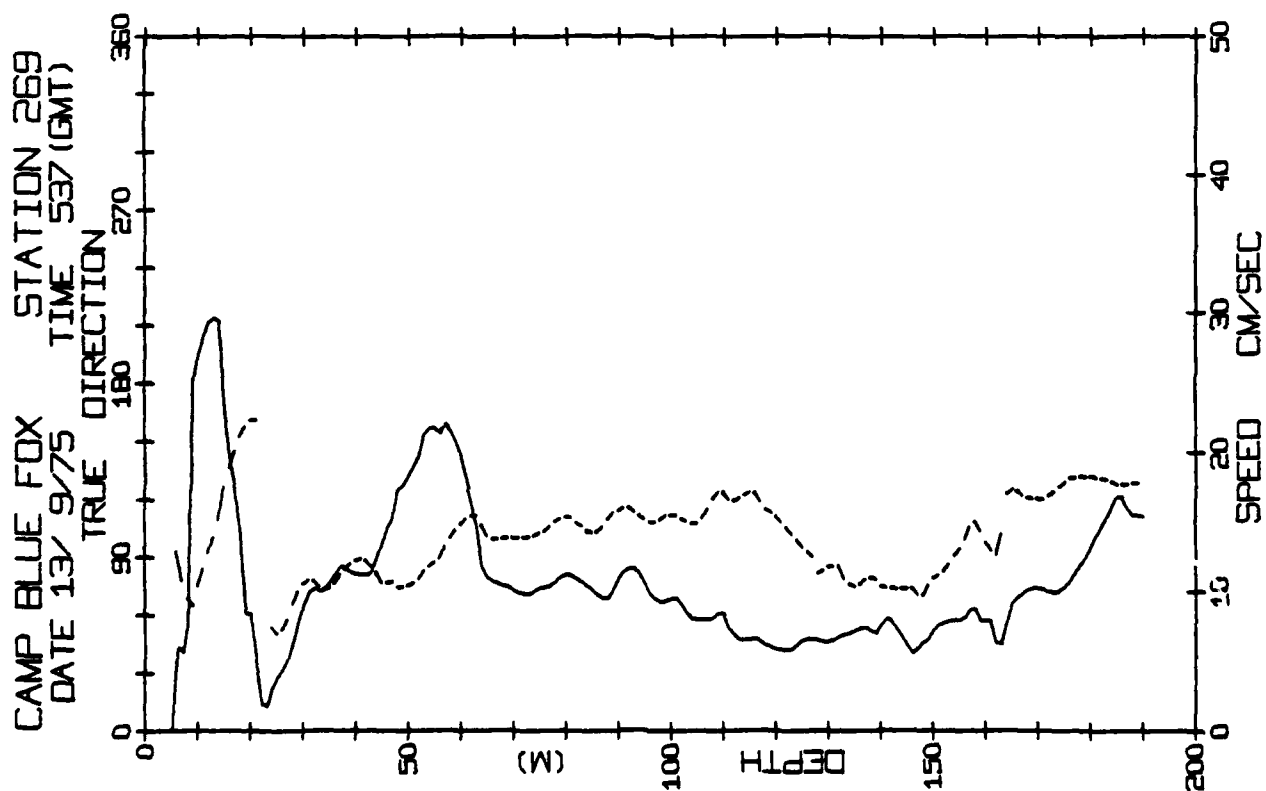
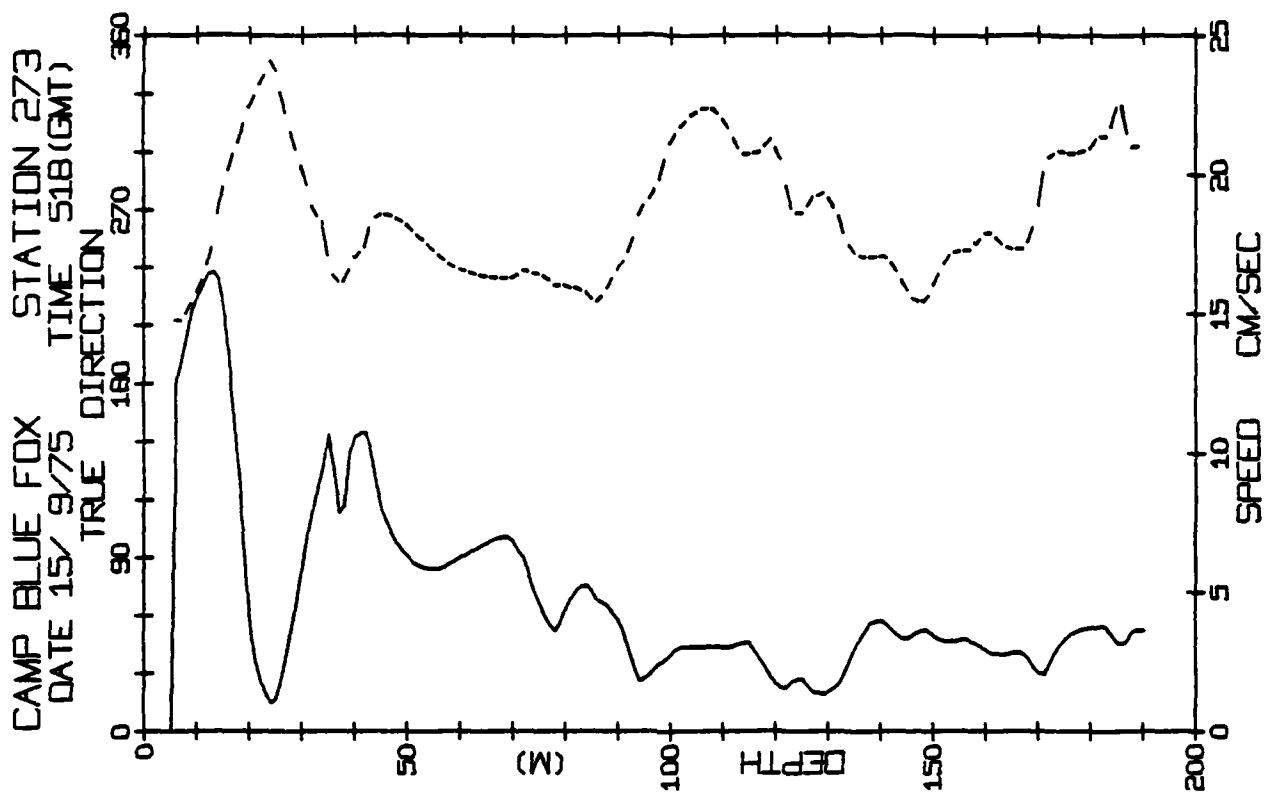


CAMP BLUE FOX STATION 267
DATE 12/ 9/75 TIME 540(GMT)



BLUE FOX STATION 267 (190M.) 12/SEP/73 540 GMT
LAT= 73.831N LONG= 134.908W LTER= 1. LOER= 1.
NIVEL= 3.0 EIVEL= 5.1 NVER= 0. EVER= 0.

[illegible][illegible]



BLUE FOX STATION 273 (190M.)
LAT= 73.8015N LONG= 134.4362W
NIVEL= -2.8 EIVEL= -7.8

[illegible][illegible][illegible][illegible][illegible][illegible][illegible]

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[illegible]

BLUE FOX STATION 269 (190M.)
LAT= 73.8611N LONG= 134.6068W
NIVEL= -0.4 EIVEL= 16.3

DRN	1	6	4	1	7	3	0	2	0	0	2	7	7	0	2	7	4	7	3	6	0	0	0	0	5	3	7	0	0	2	7	7	0	0	9	7	1	0	1	0	0	7	1	0	1	0	0	7	6			
	76	74	76	76	79	78	73	74	73	74	74	74	74	73	70	70	75	81	83	86	90	90	94	99	05	08	03	97	93	91	01	22	23	21	19	19	12	22	24	26	29	31	33	32	31	30	30	28	27	27	28	26

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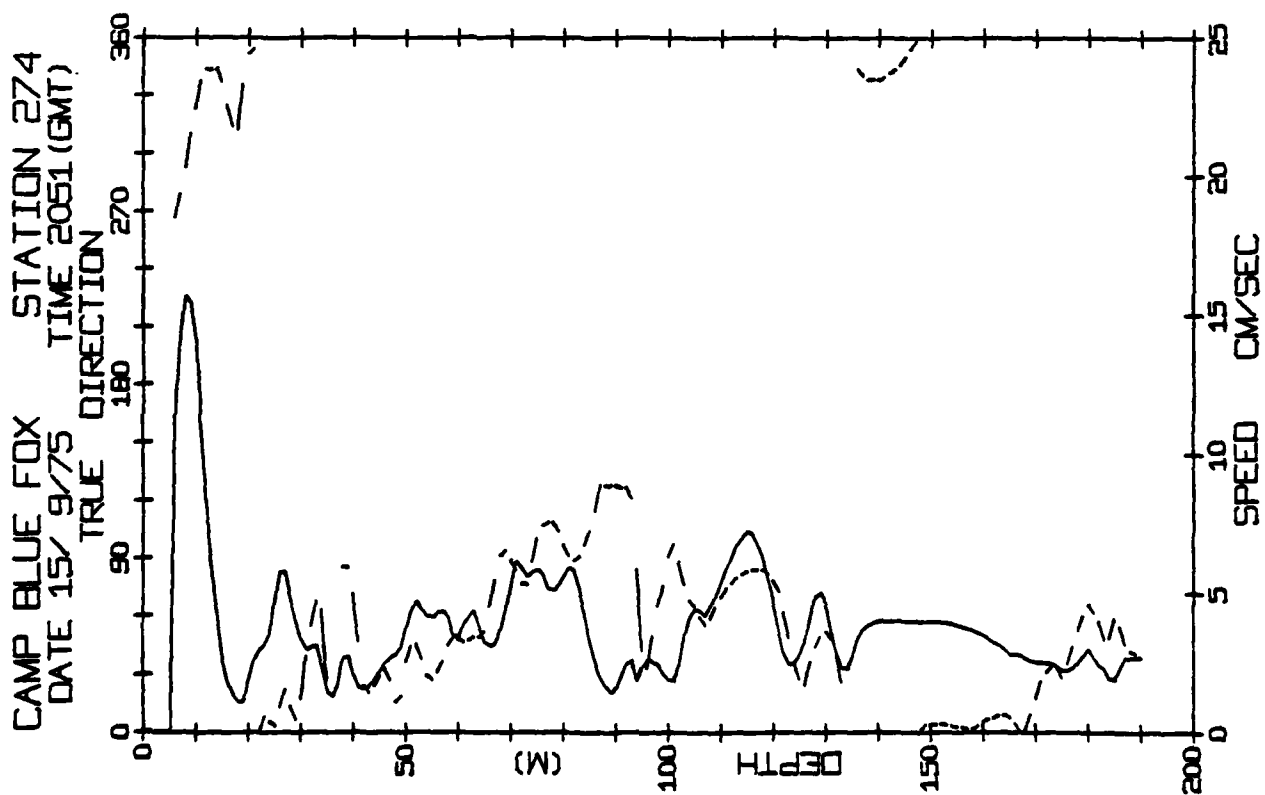
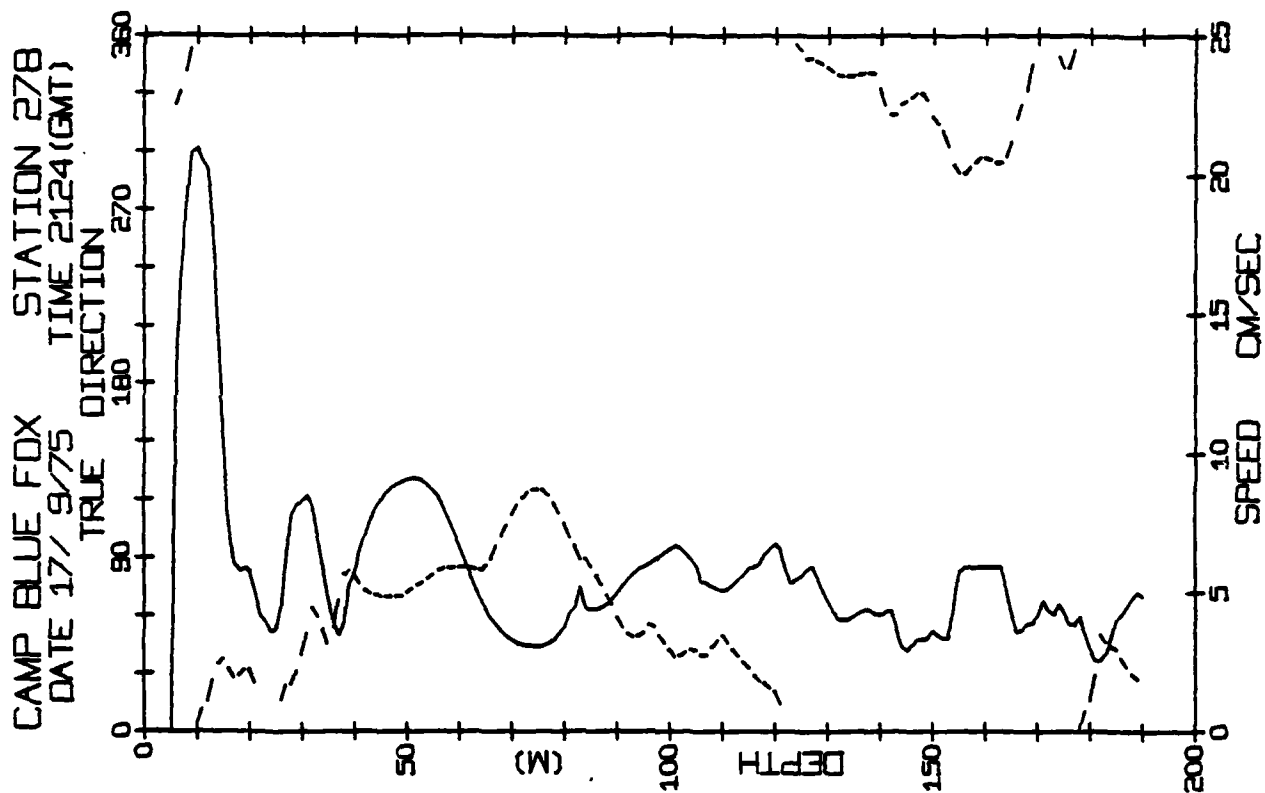
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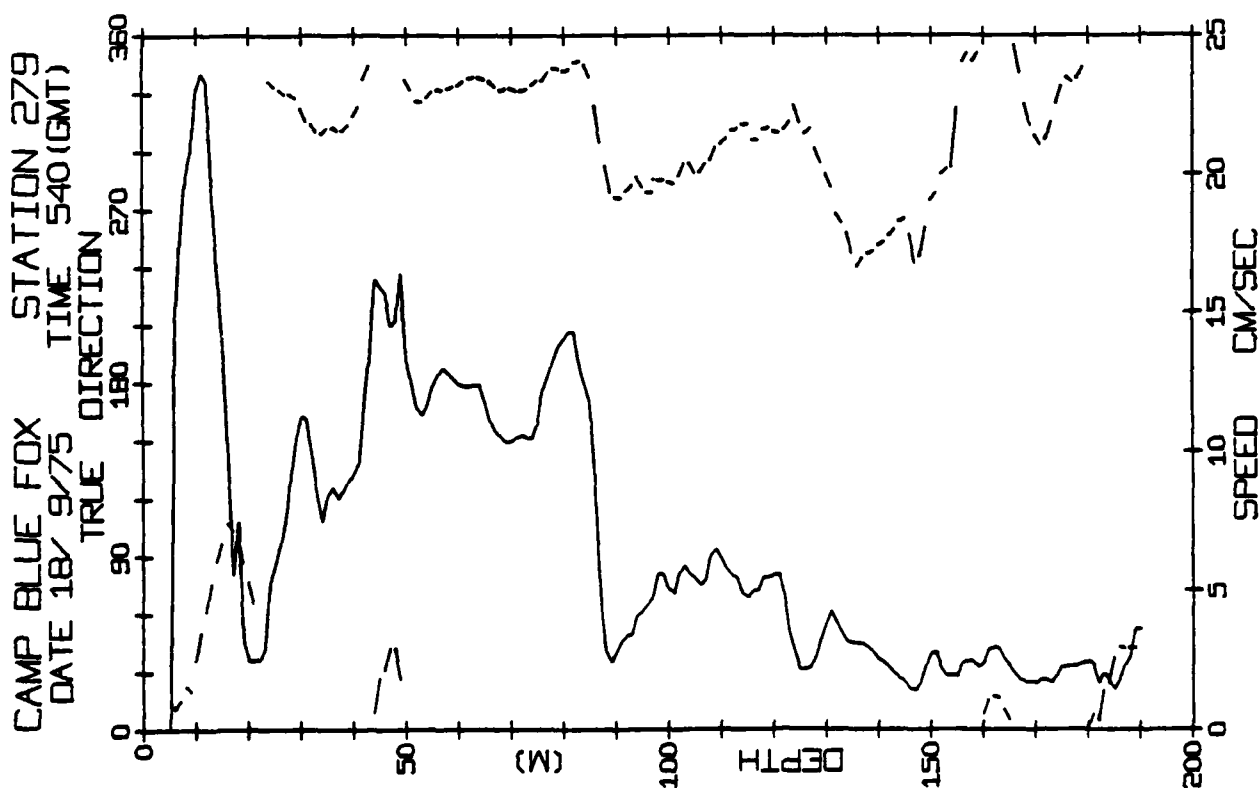
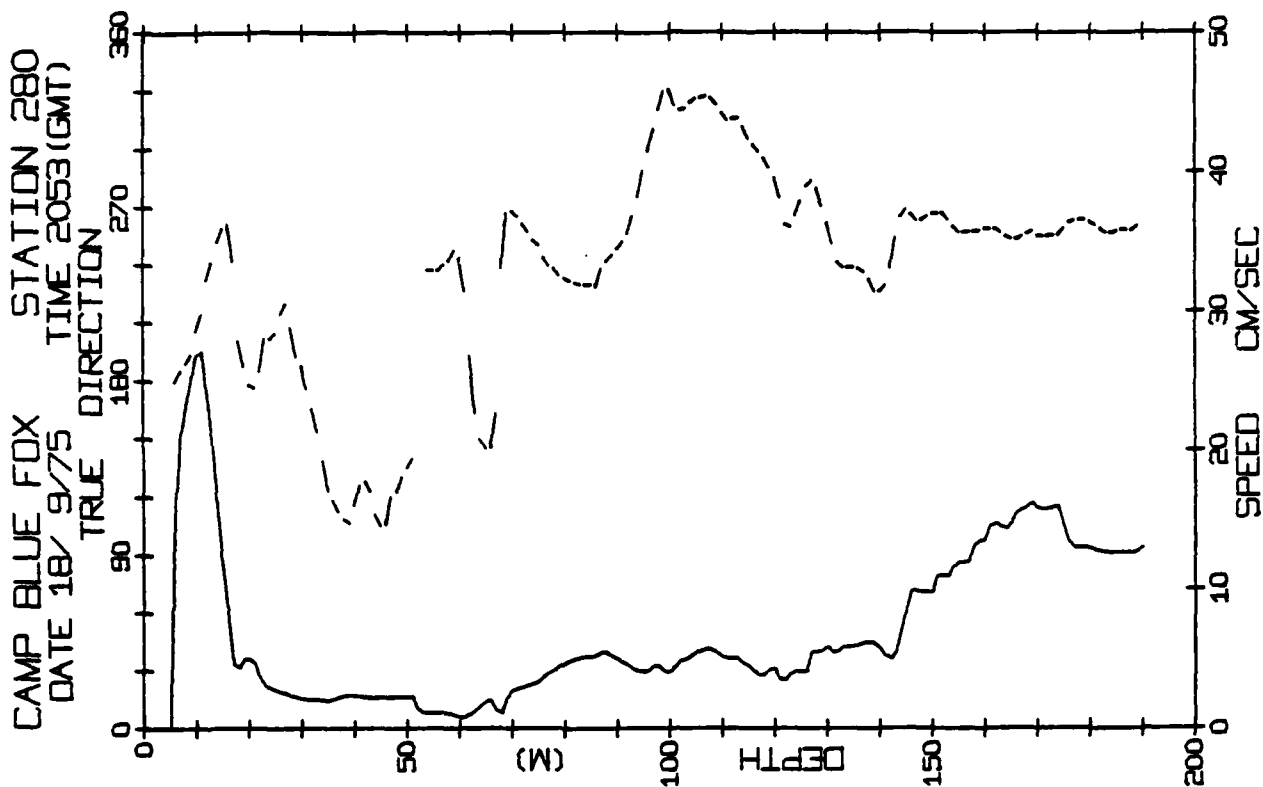
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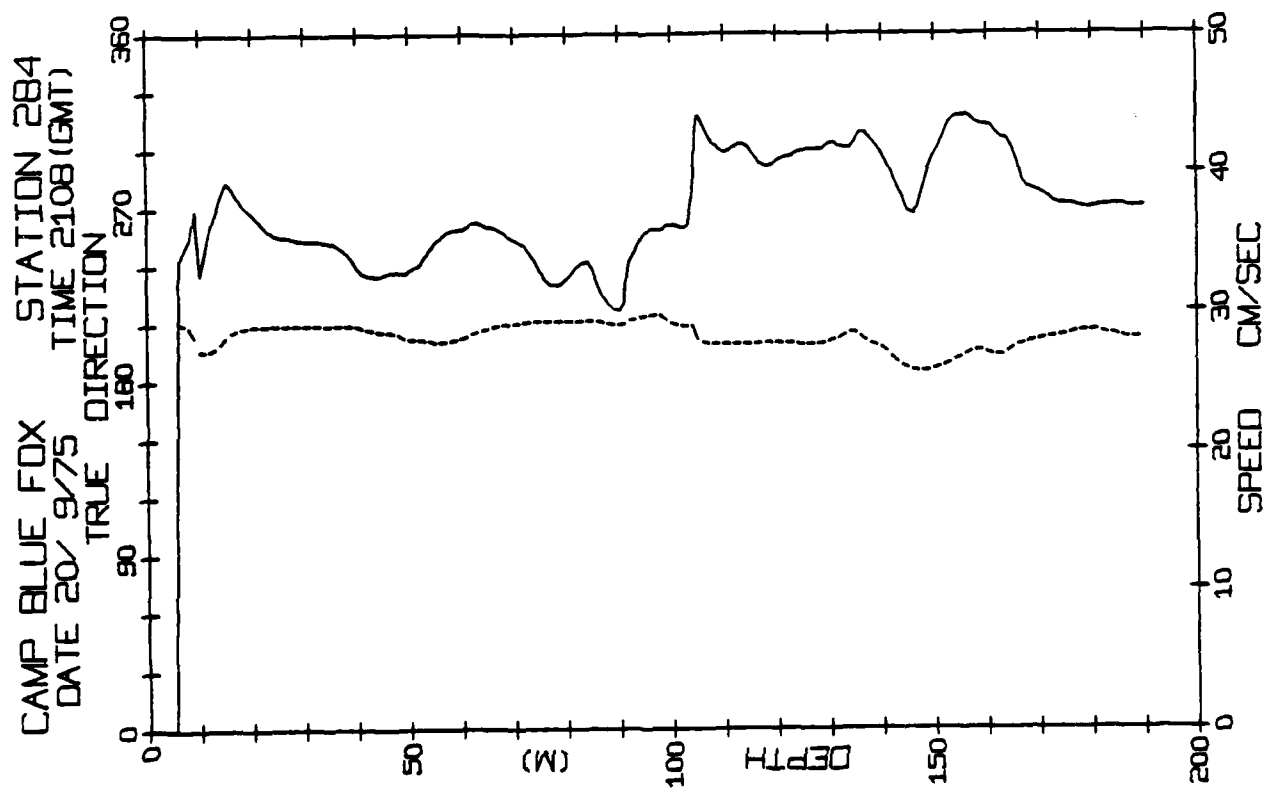
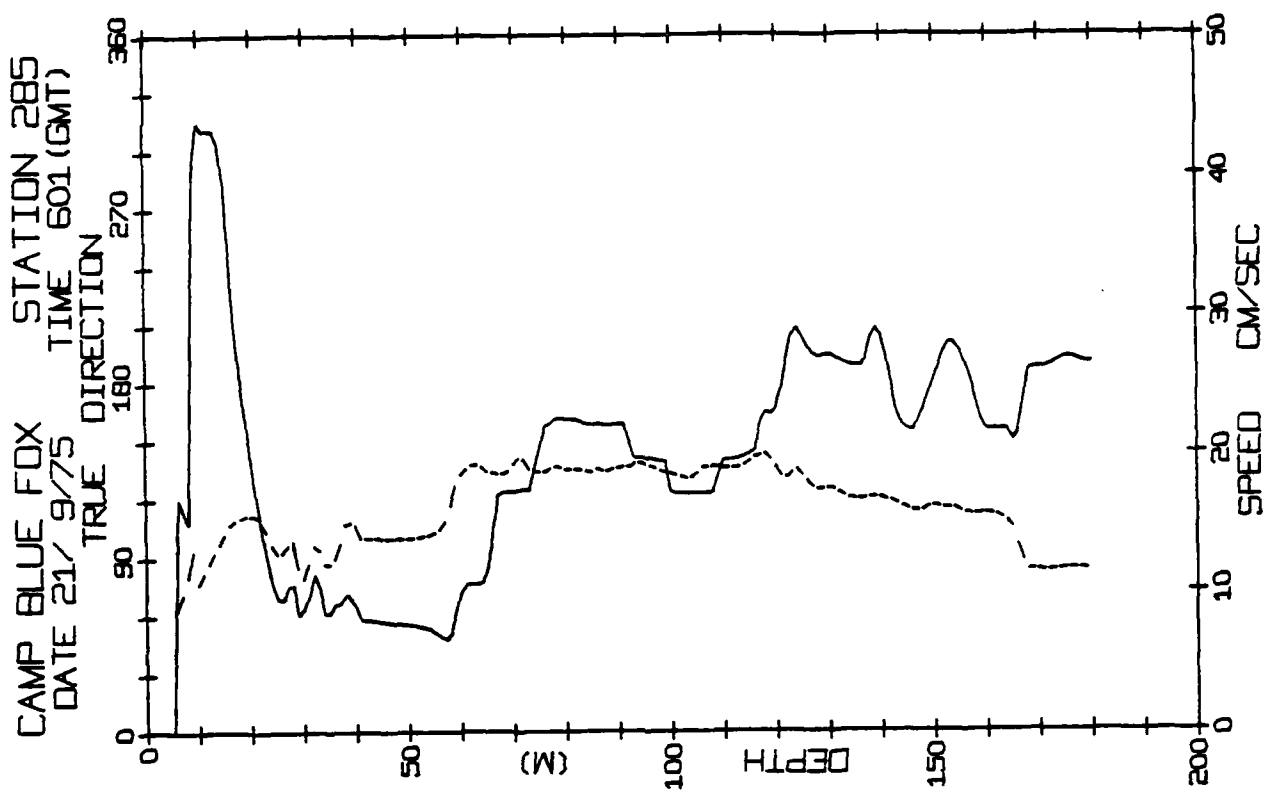
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[illegible]







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LAMONT-DOHERTY GEOLOGICAL OBSERVATORY PALISADES NY

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ARCTIC ICE DYNAMICS JOINT EXPERIMENT 1975-1976, PHYSICAL OCEANO--ETC(U)

FEB 80 T O MANLEY, K HUNKINS, W TIEMANN

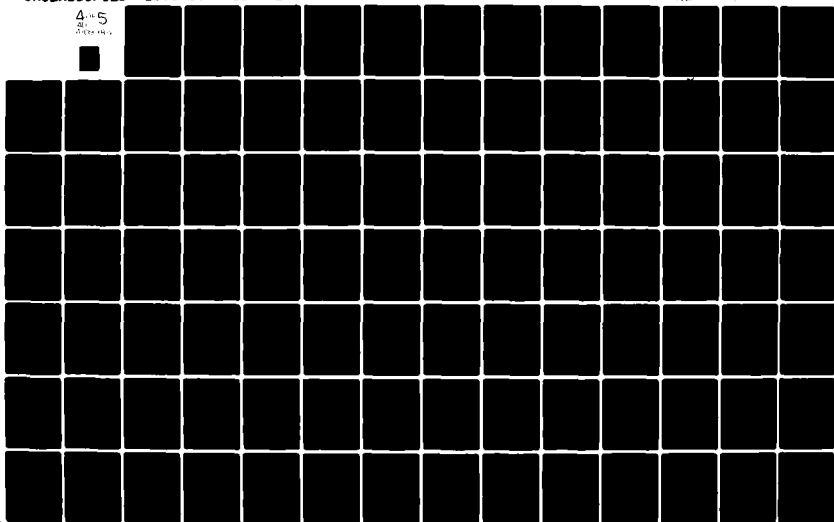
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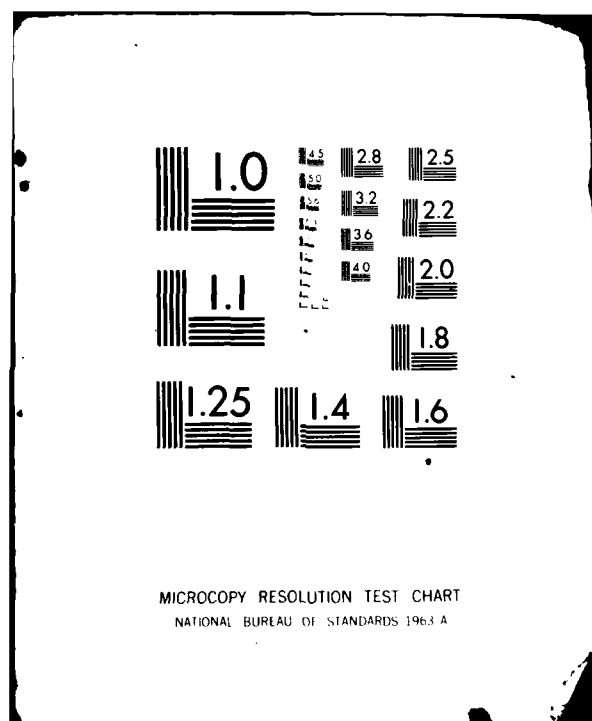
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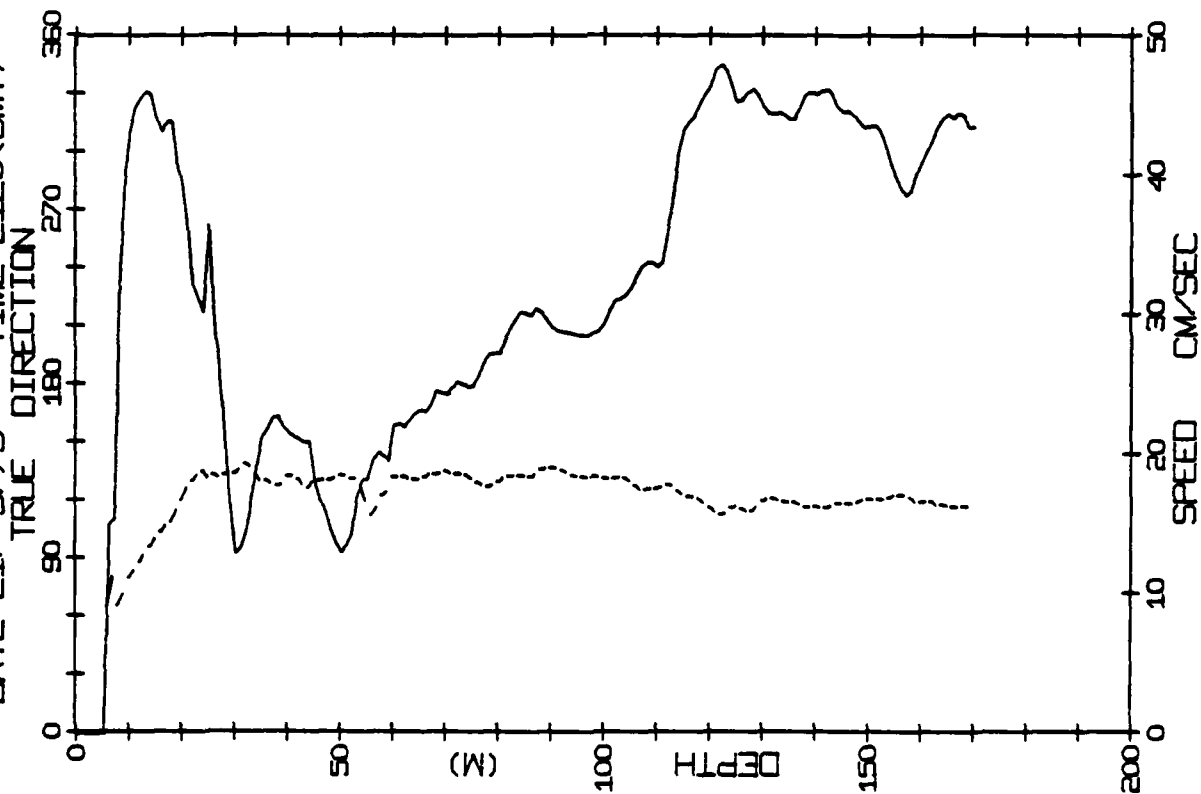
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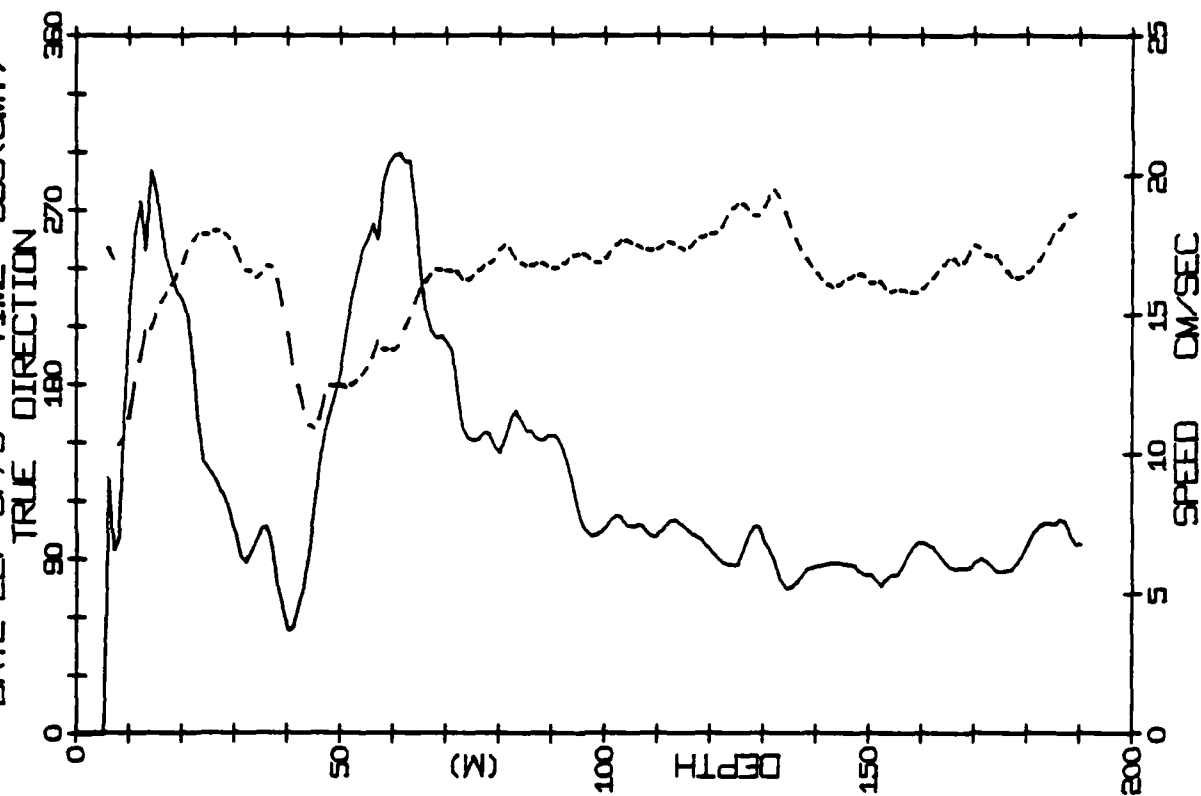




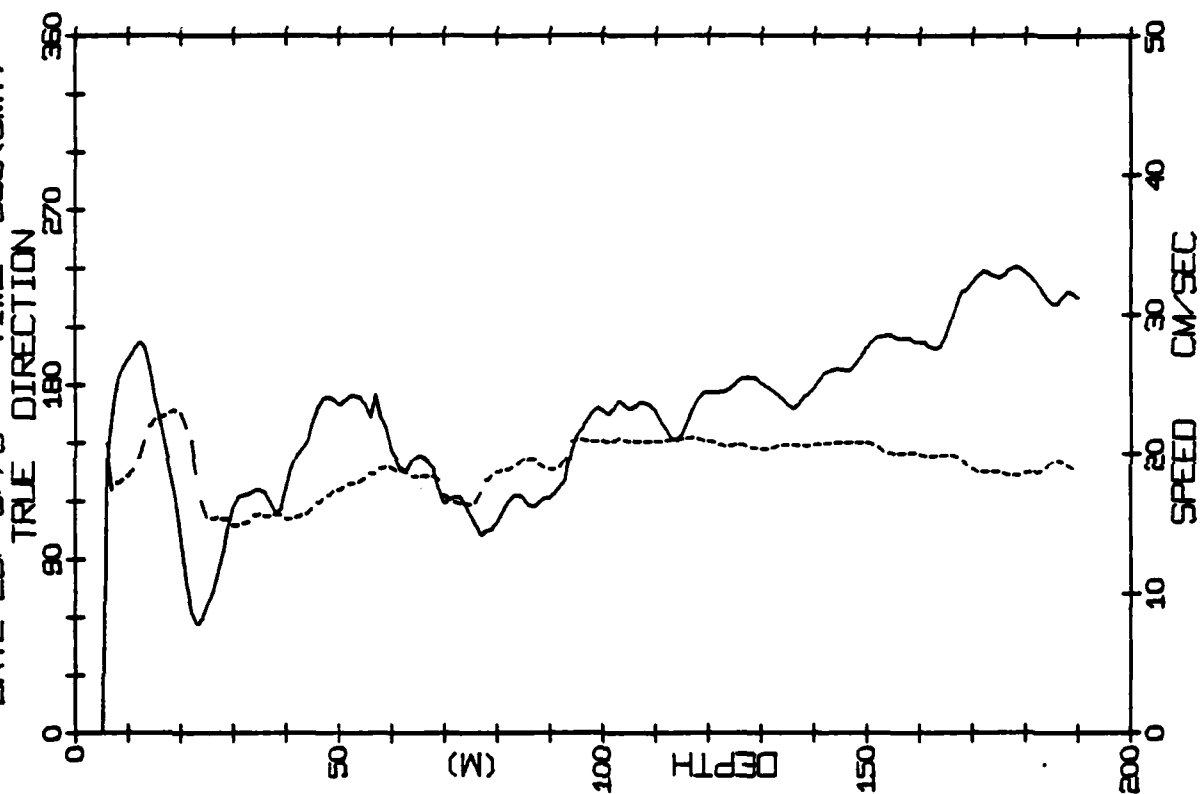
CAMP BLUE FOX STATION 286
DATE 21/ 9/75 TIME 2120 (GMT)



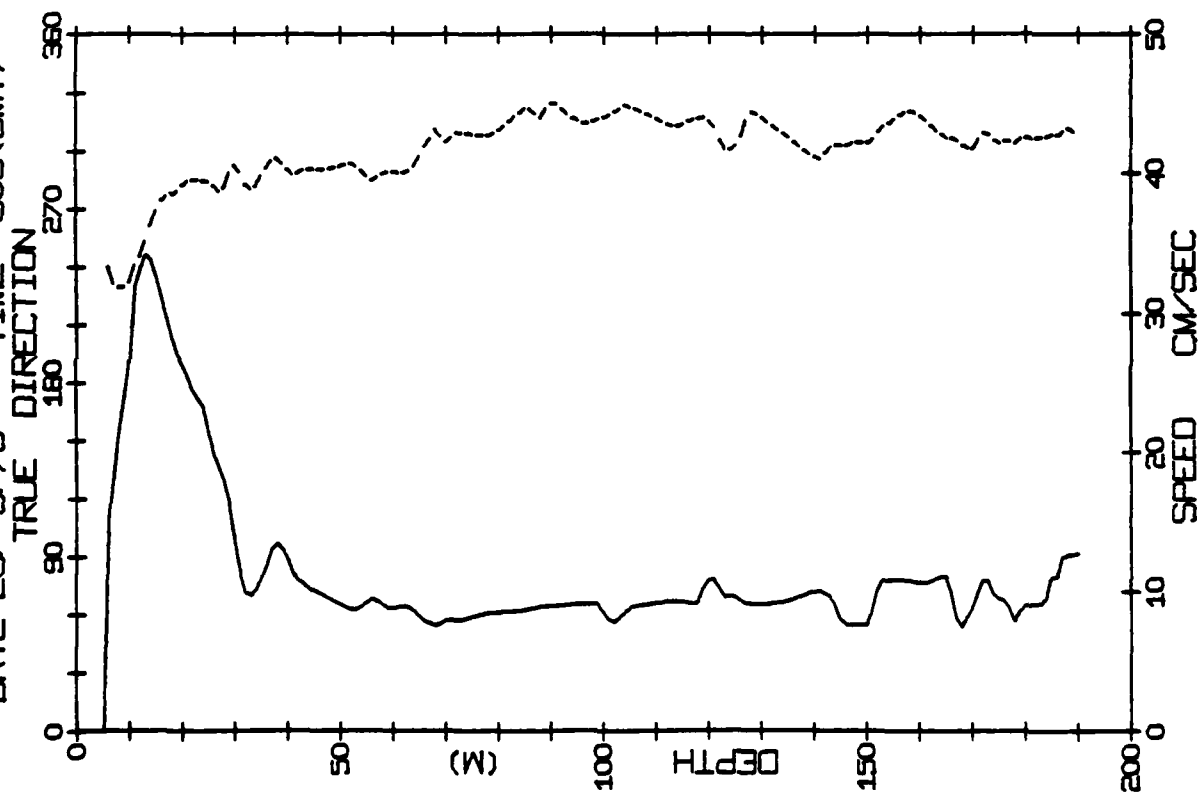
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DATE 22/ 9/75 TIME 553 (GMT)



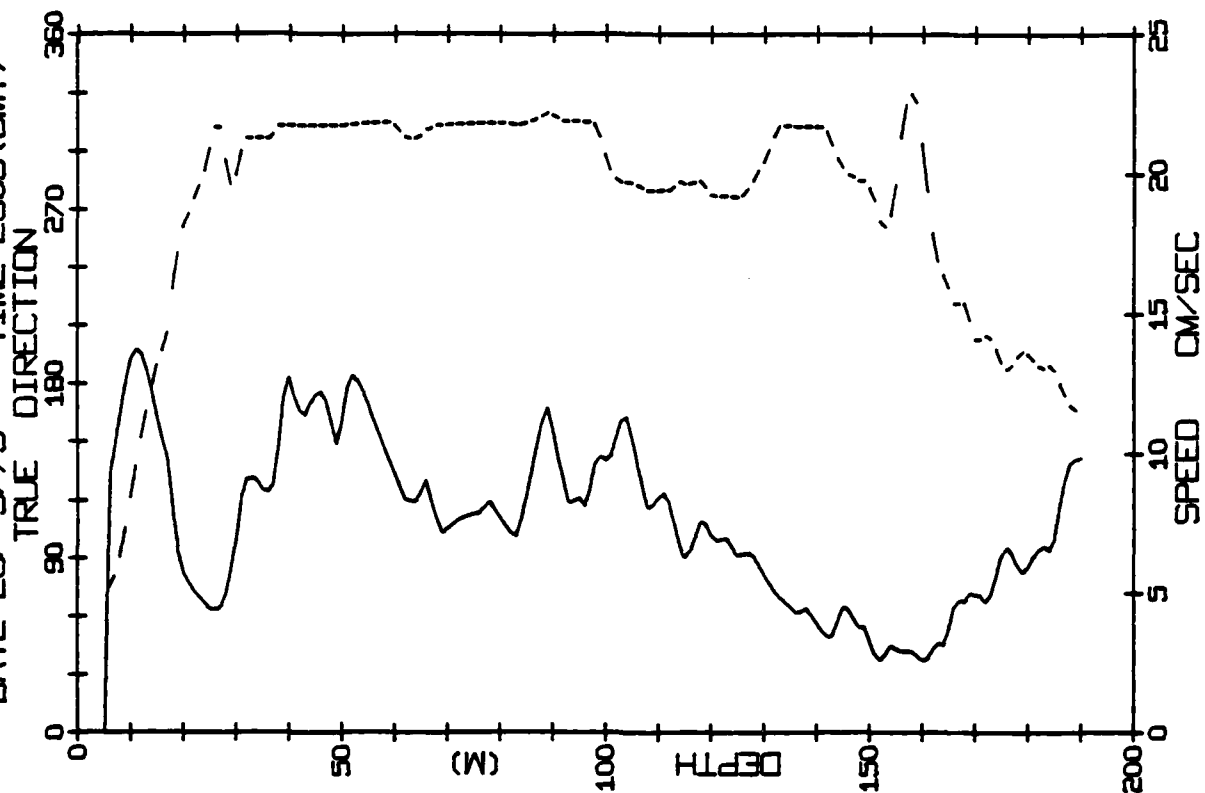
CAMP BLUE FOX STATION 293
DATE 25/ 9/75 TIME 536 (GMT)



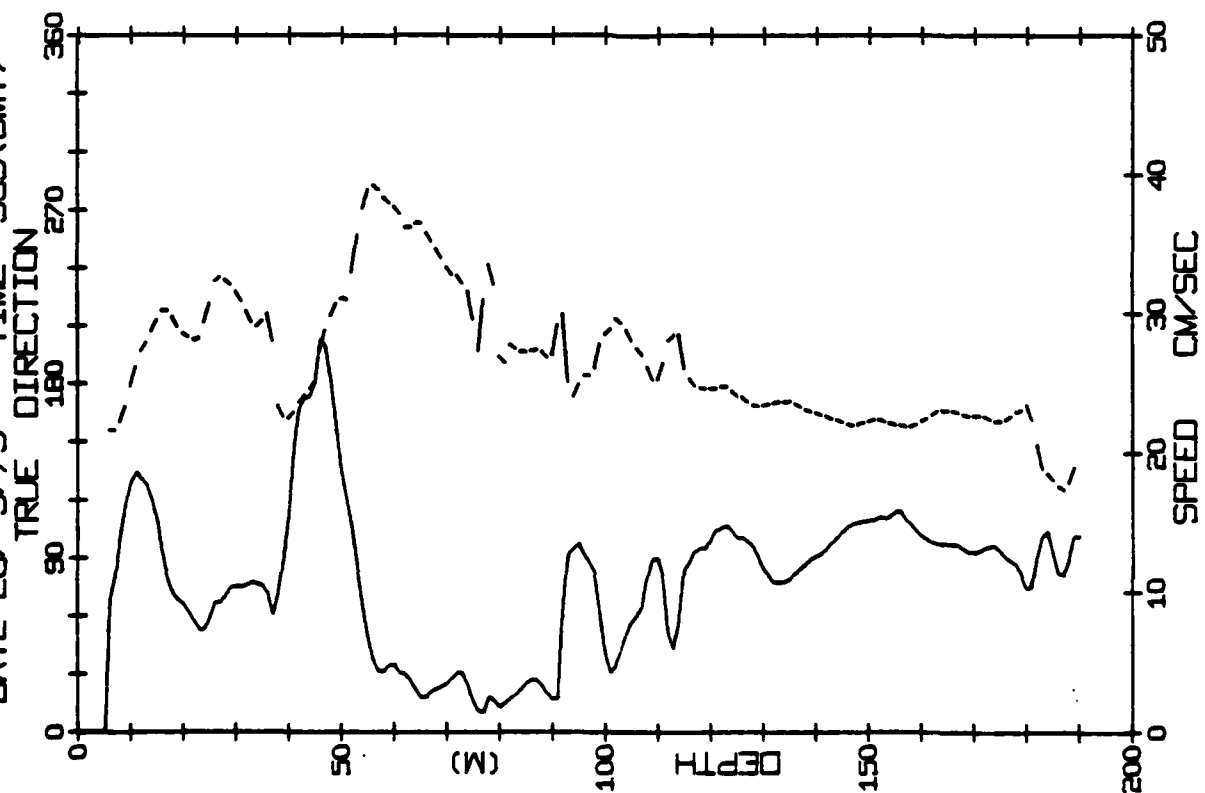
CAMP BLUE FOX STATION 289
DATE 23/ 9/75 TIME 603 (GMT)



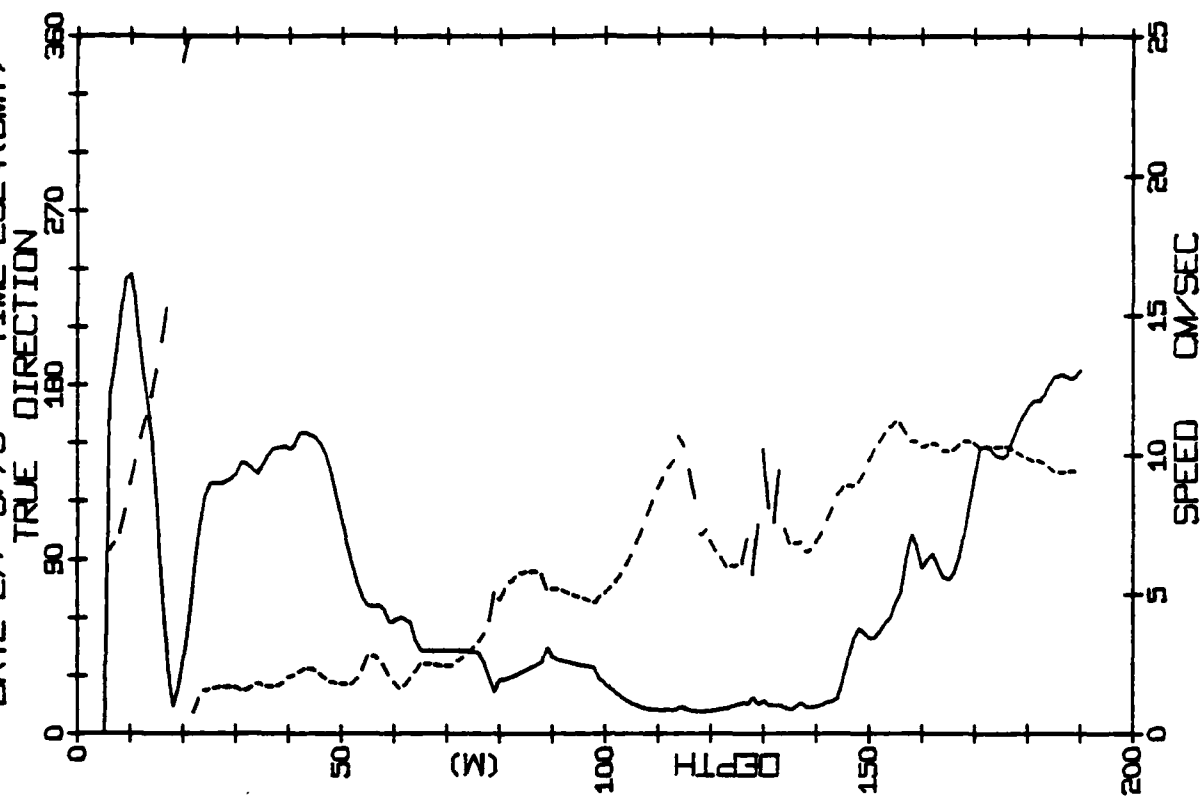
CAMP BLUE FOX STATION 296
DATE 26/ 9/75 TIME 2305 (GMT)



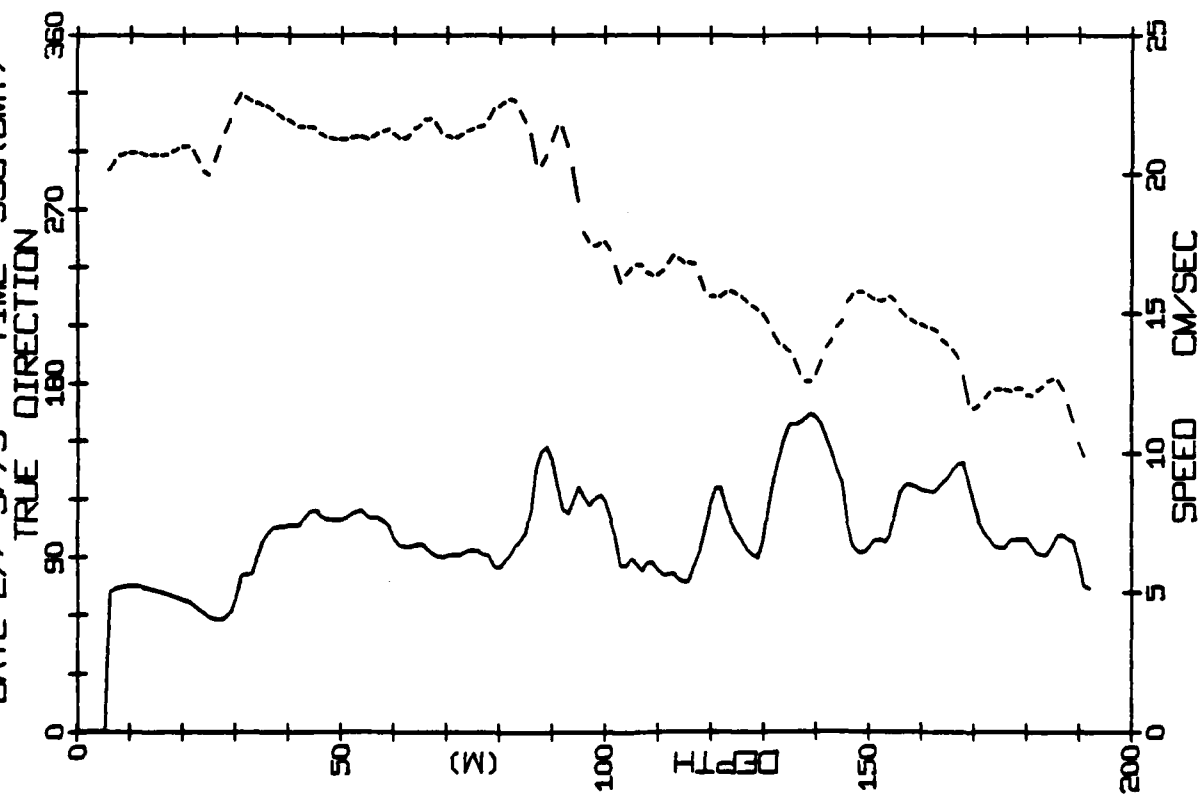
CAMP BLUE FOX STATION 295
DATE 26/ 9/75 TIME 539 (GMT)



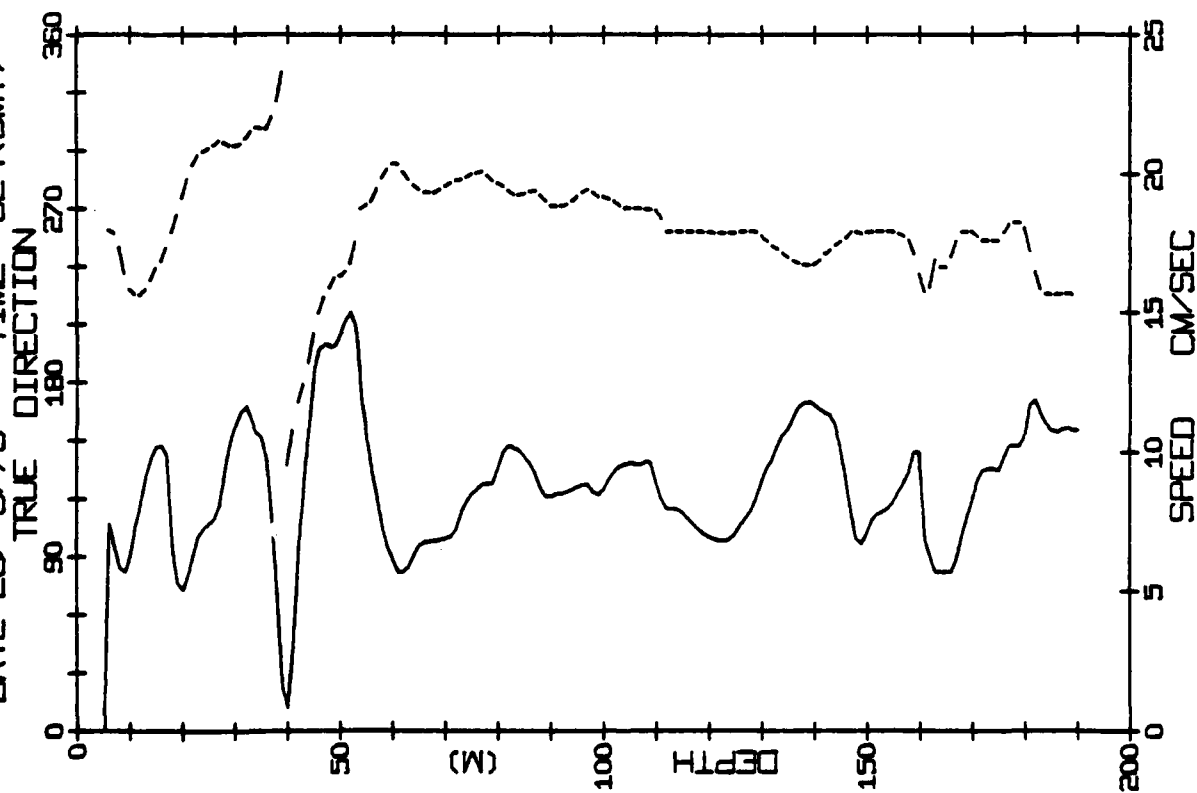
CAMP BLUE FOX STATION 298
DATE 27/ 9/75 TIME 2324 (GMT)



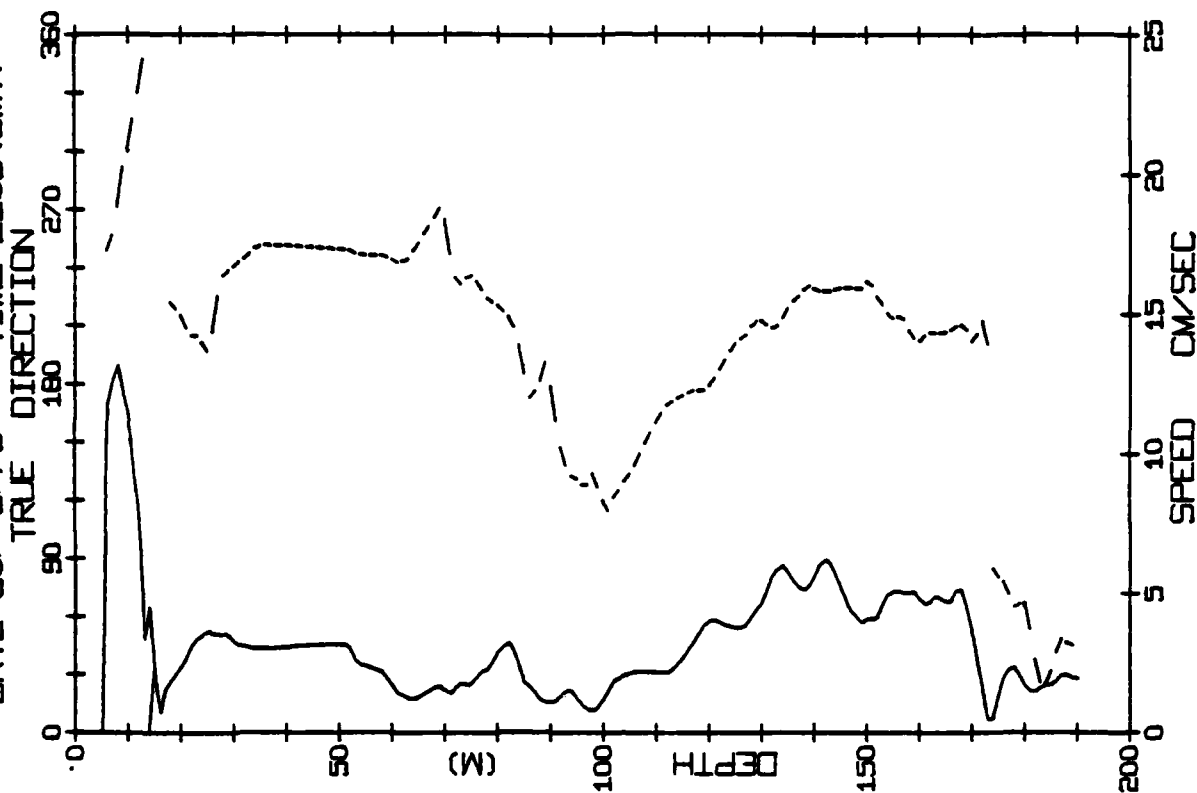
CAMP BLUE FOX STATION 297
DATE 27/ 9/75 TIME 536 (GMT)



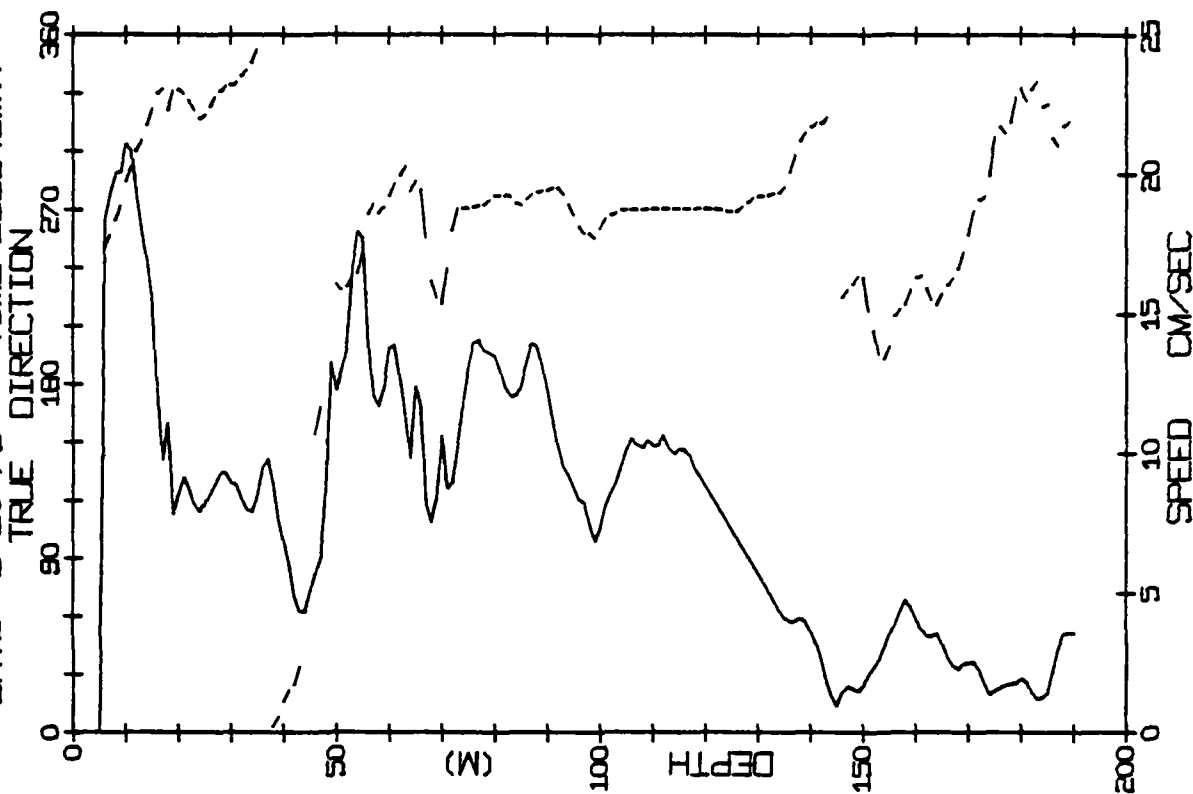
CAMP BLUE FOX STATION 299
DATE 28/ 9/75 TIME 524(GMT)



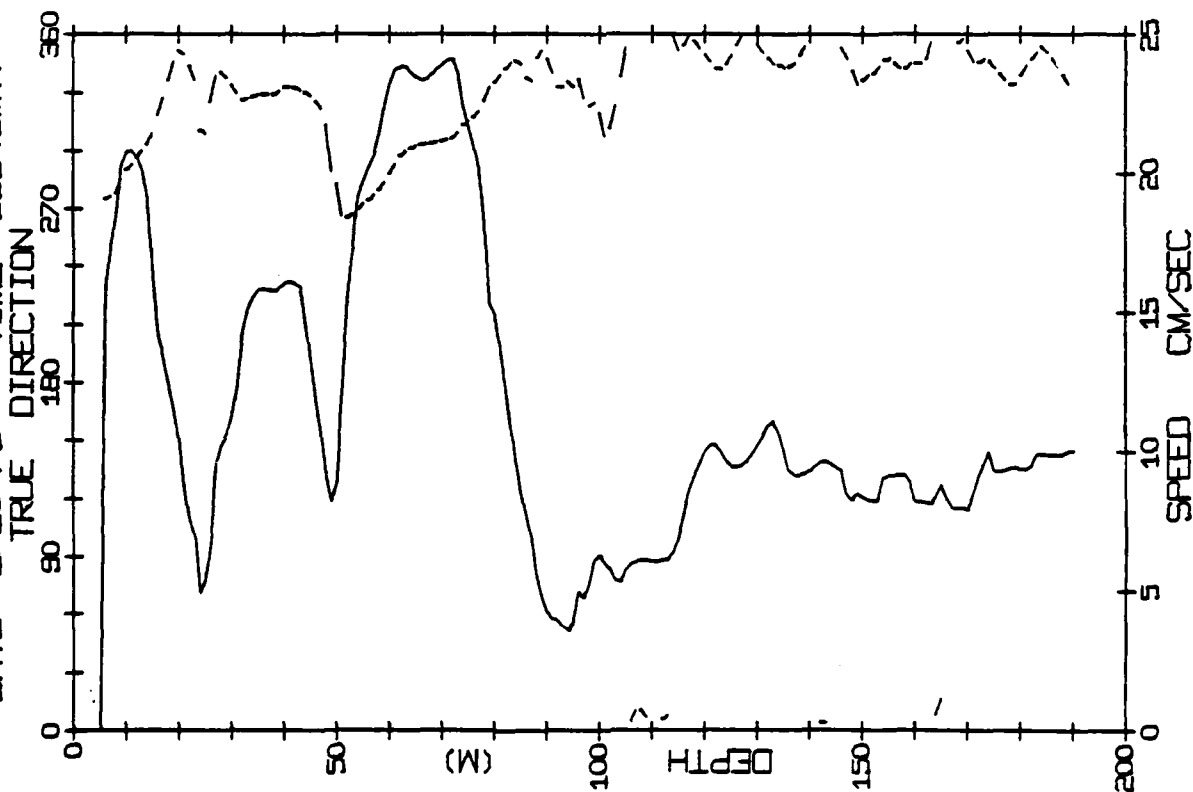
CAMP BLUE FOX STATION 304
DATE 30/ 9/75 TIME 2109(GMT)

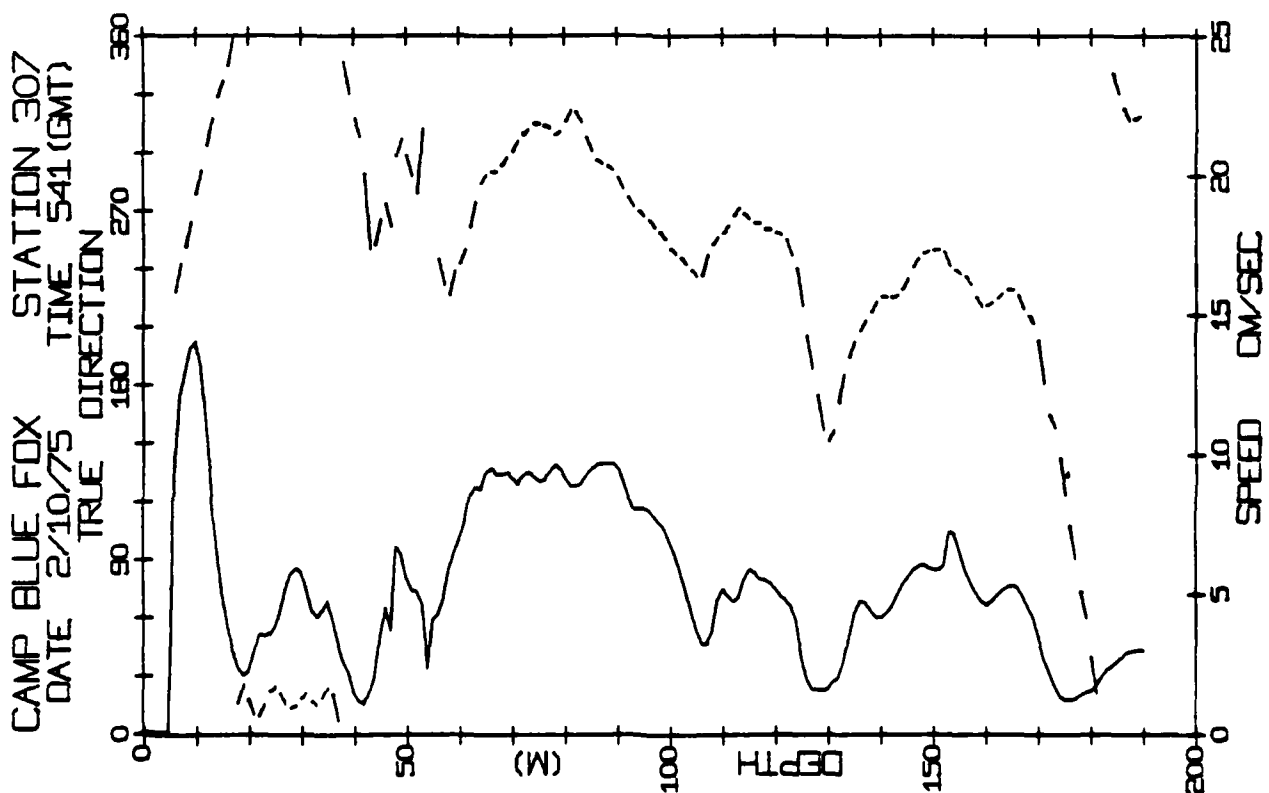
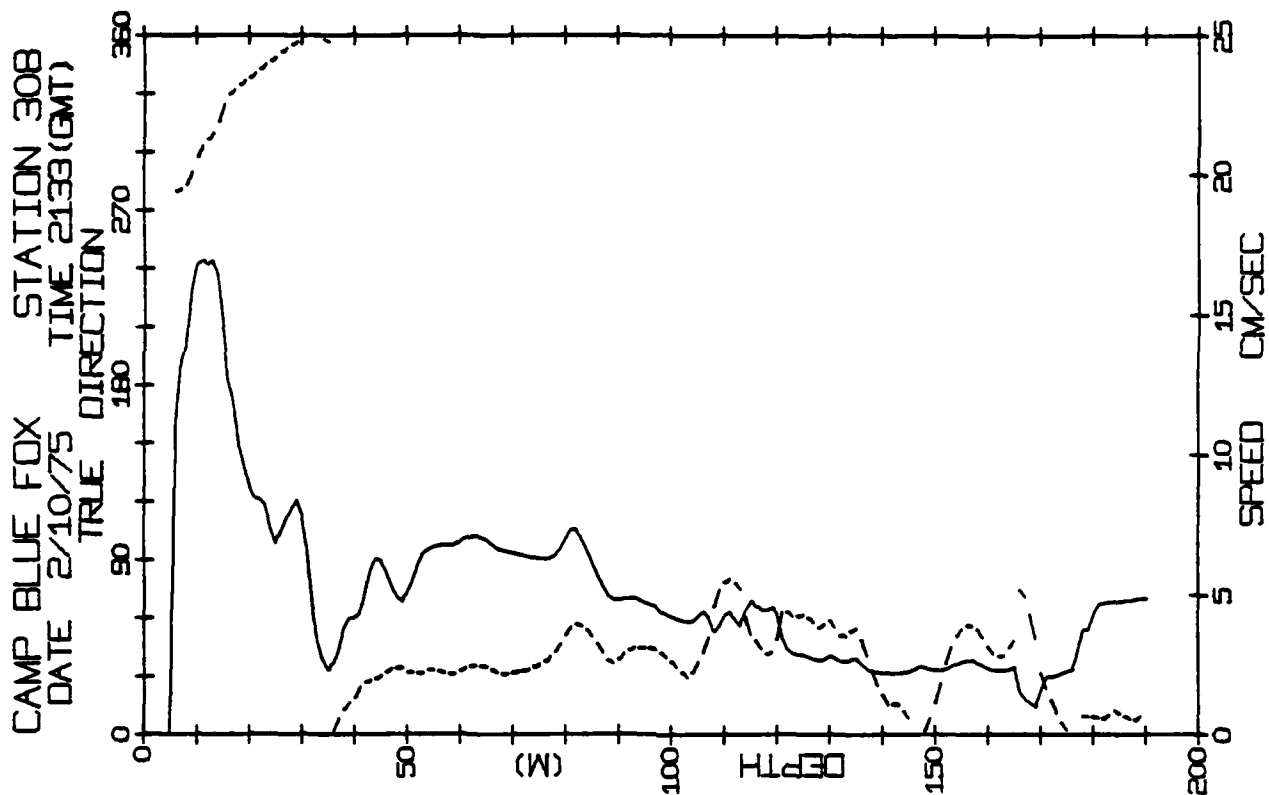


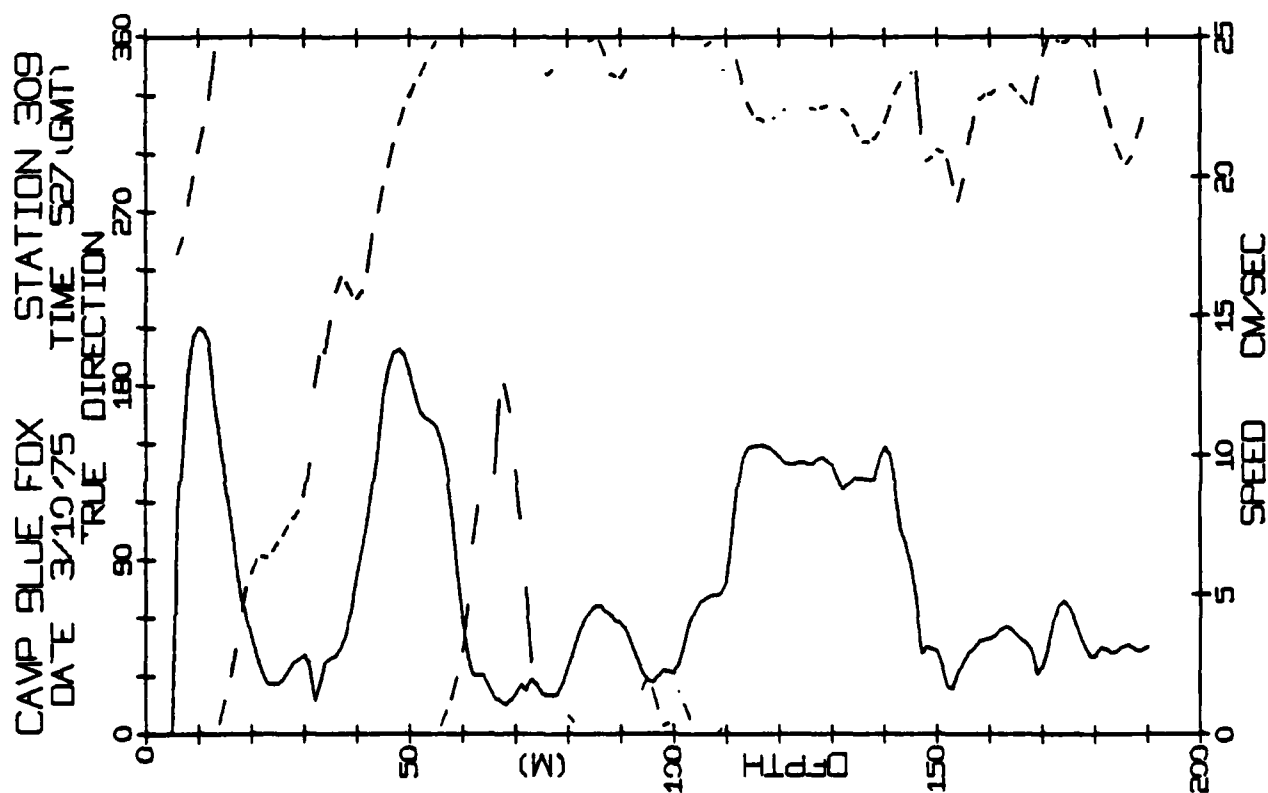
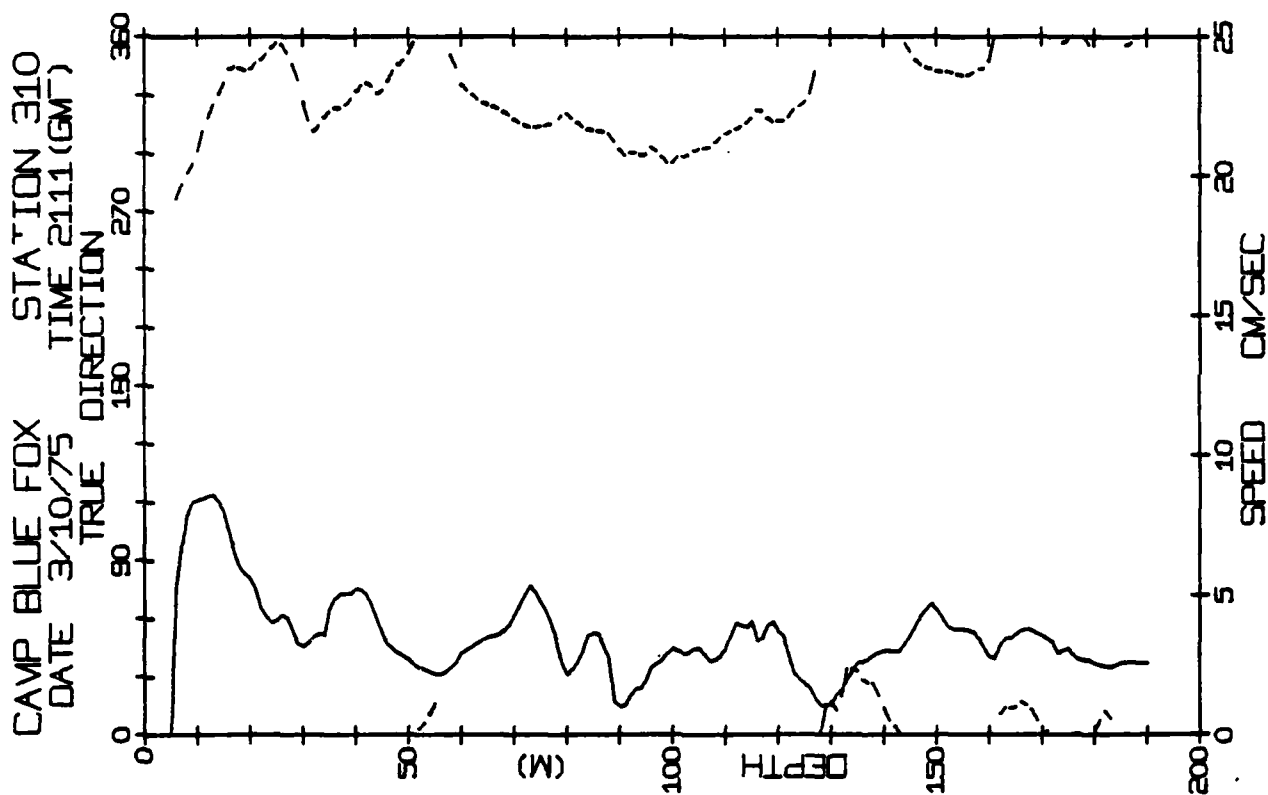
CAMP BLUE FOX STATION 306
DATE 1/10/75 TIME 2118(GMT)



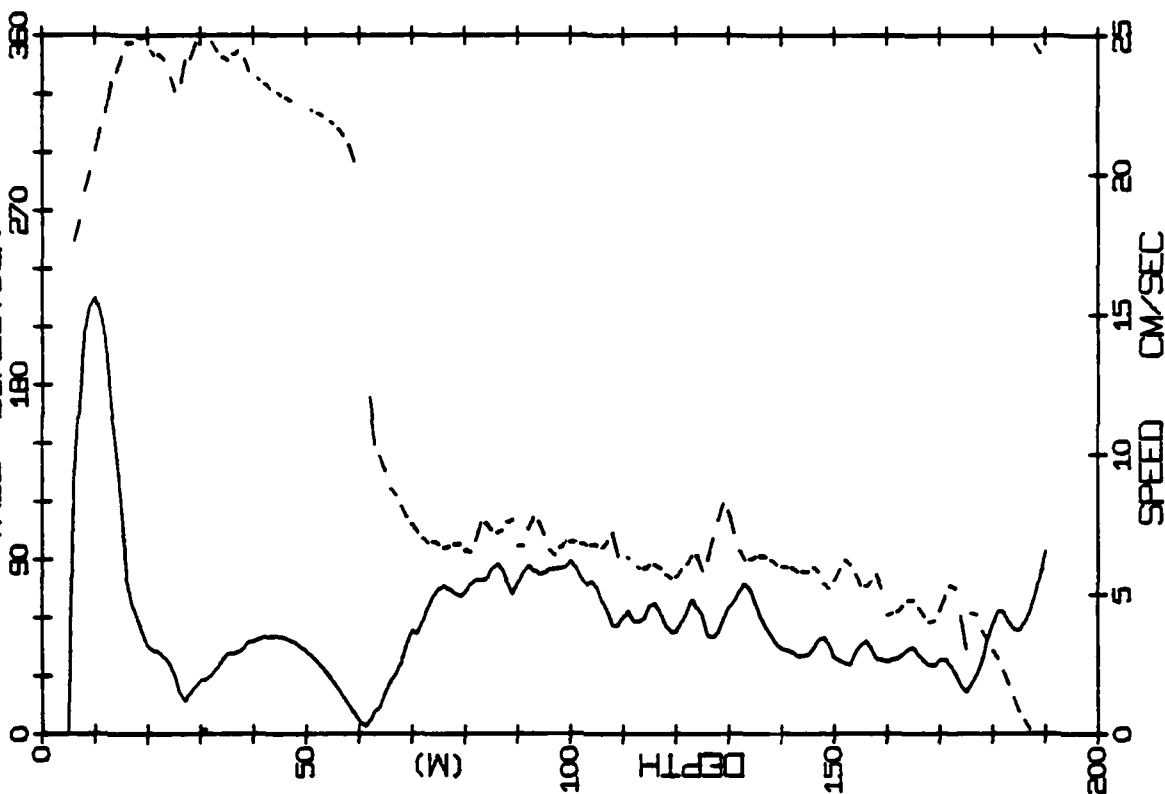
CAMP BLUE FOX STATION 305
DATE 1/10/75 TIME 555(GMT)



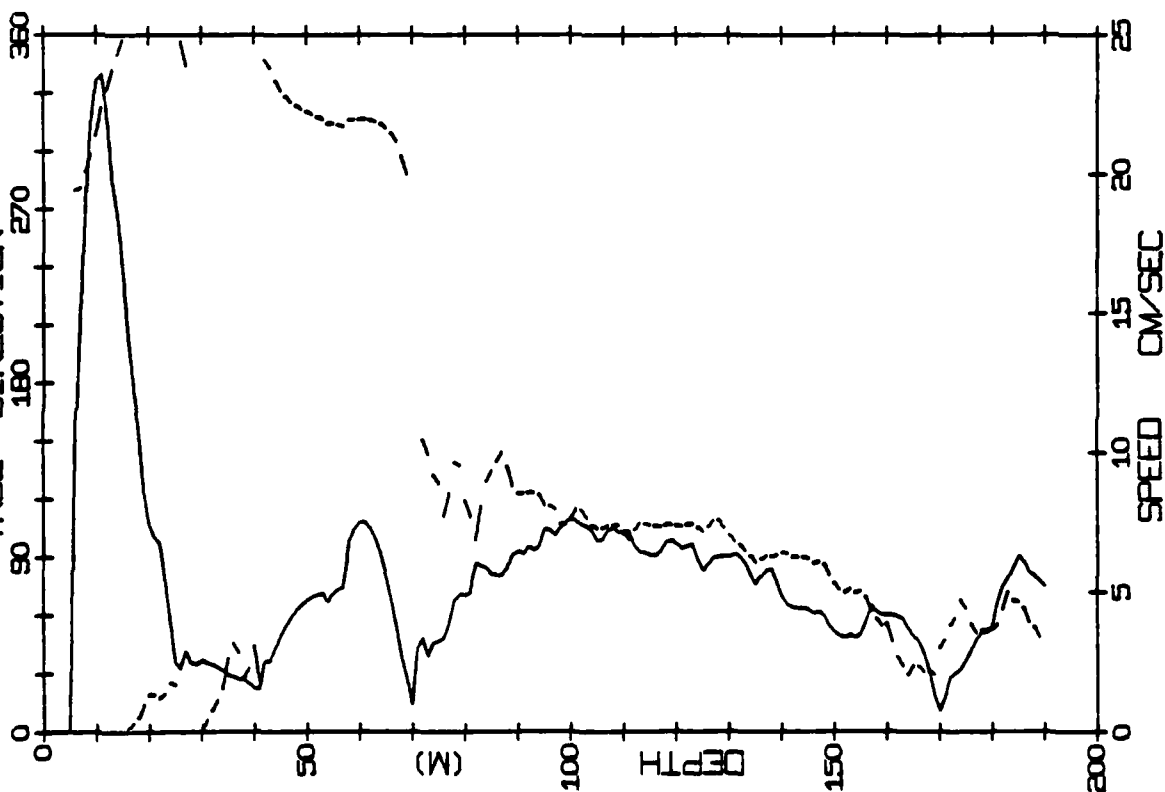




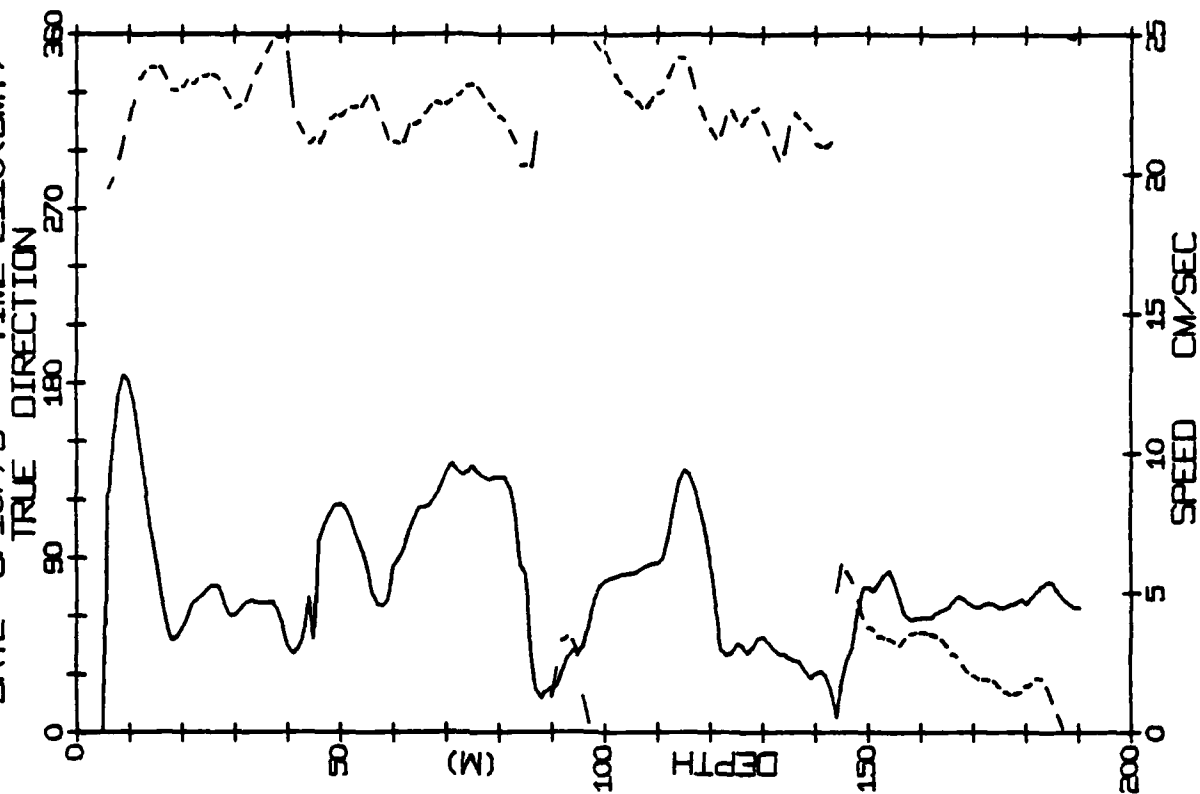
CAMP BLUE FOX STATION 313
 DATE 5/10/75 TIME 559(GMT)
 TRUE DIRECTION



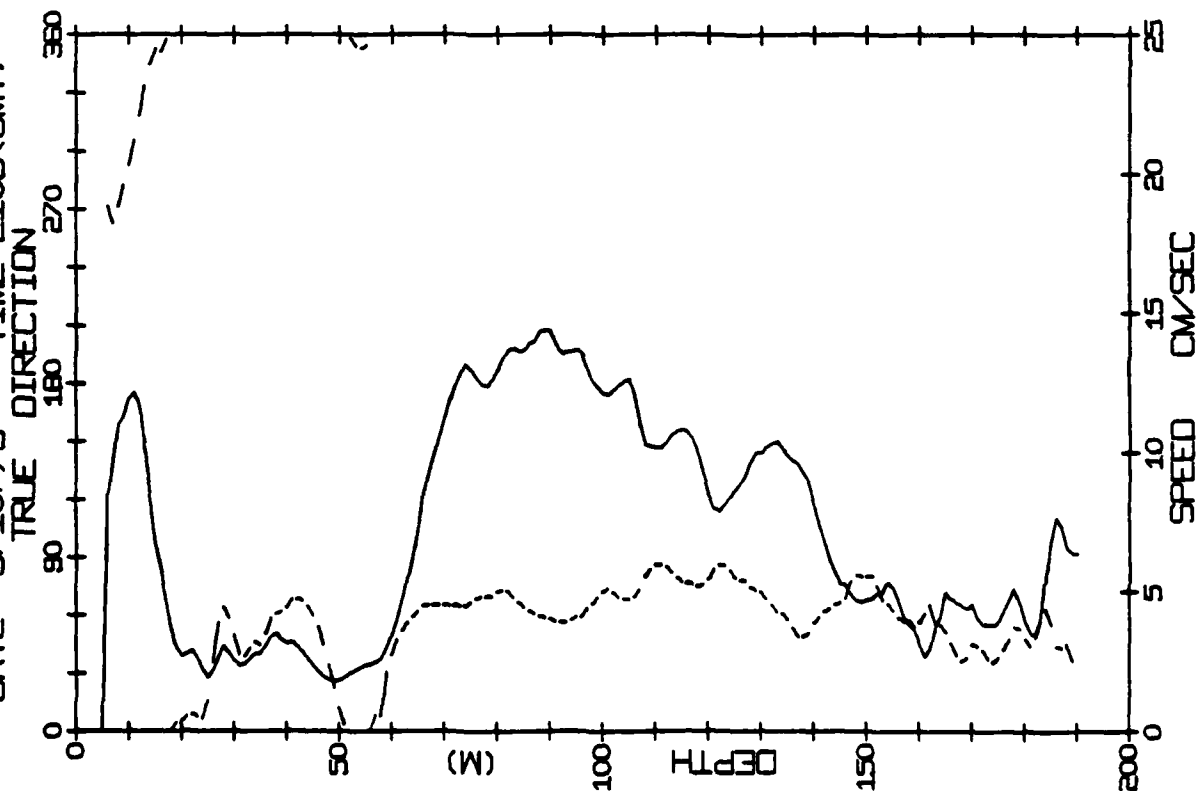
CAMP BLUE FOX STATION 312
 DATE 4/10/75 TIME 2126(GMT)
 TRUE DIRECTION



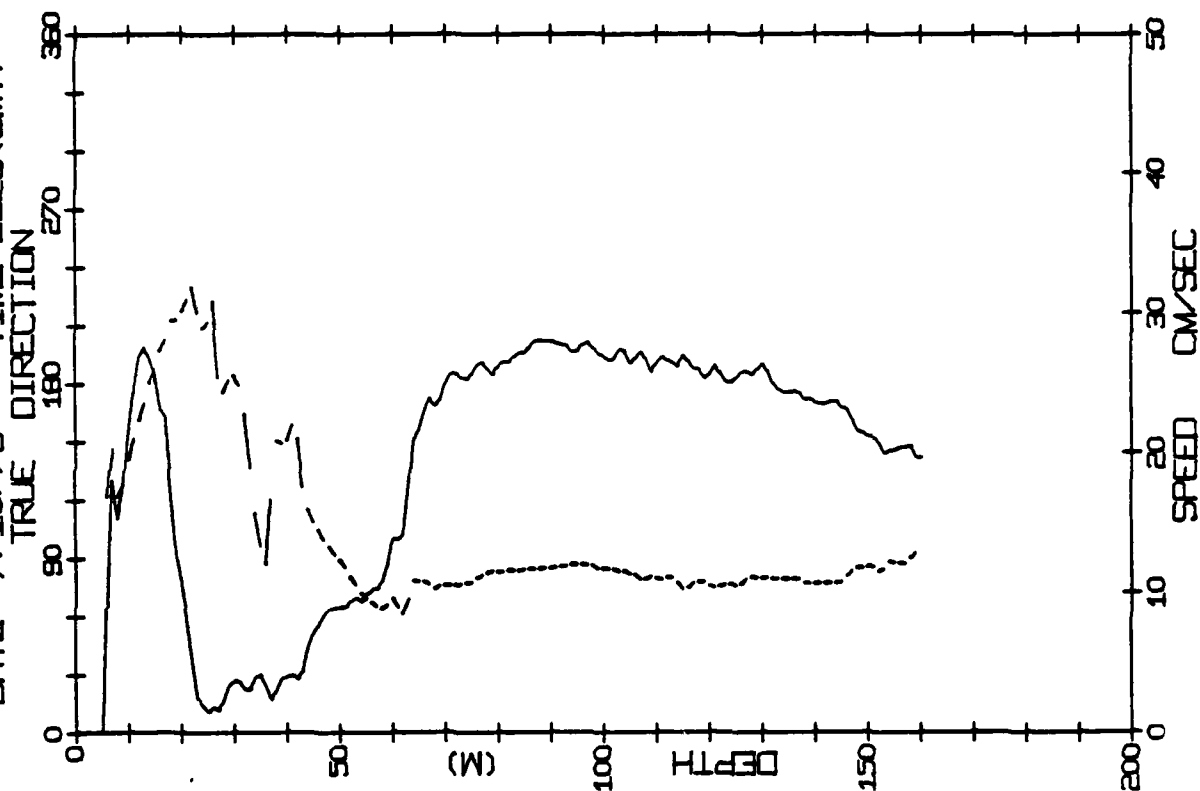
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DATE 6/10/75 TIME 2110 (GMT)



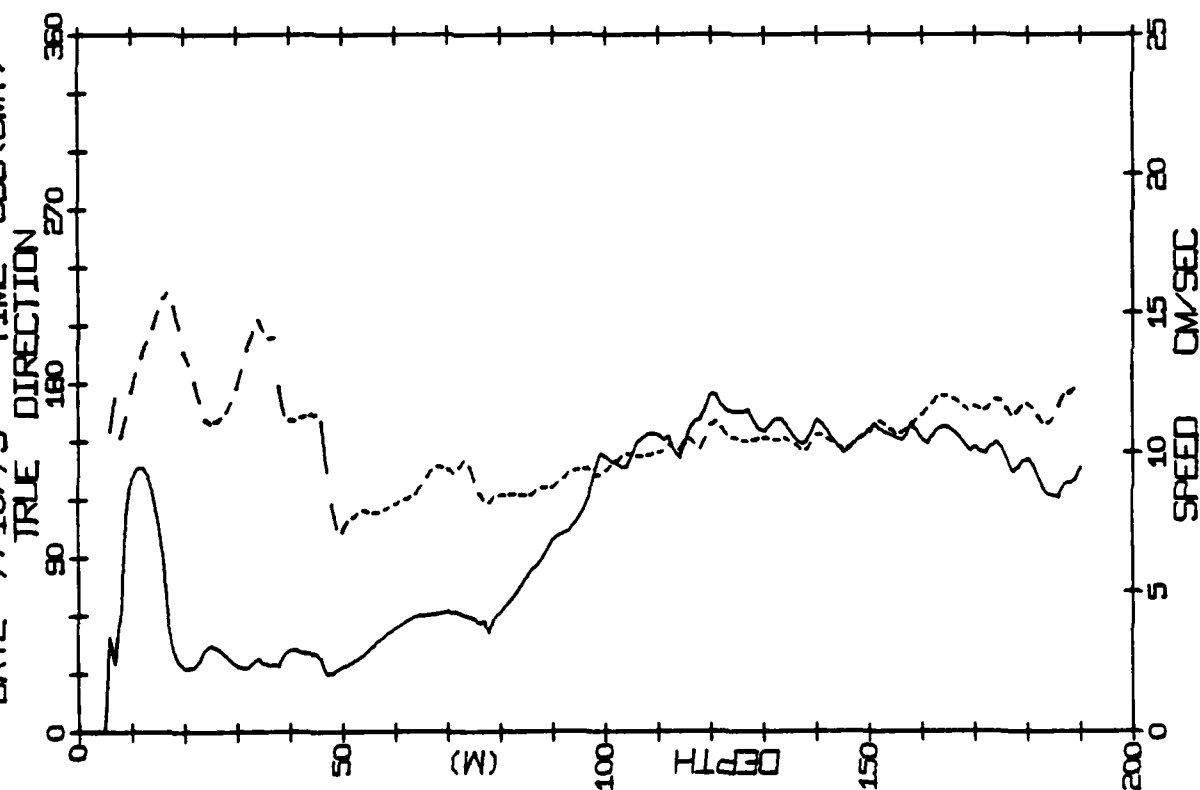
CAMP BLUE FOX STATION 314
DATE 5/10/75 TIME 2109 (GMT)



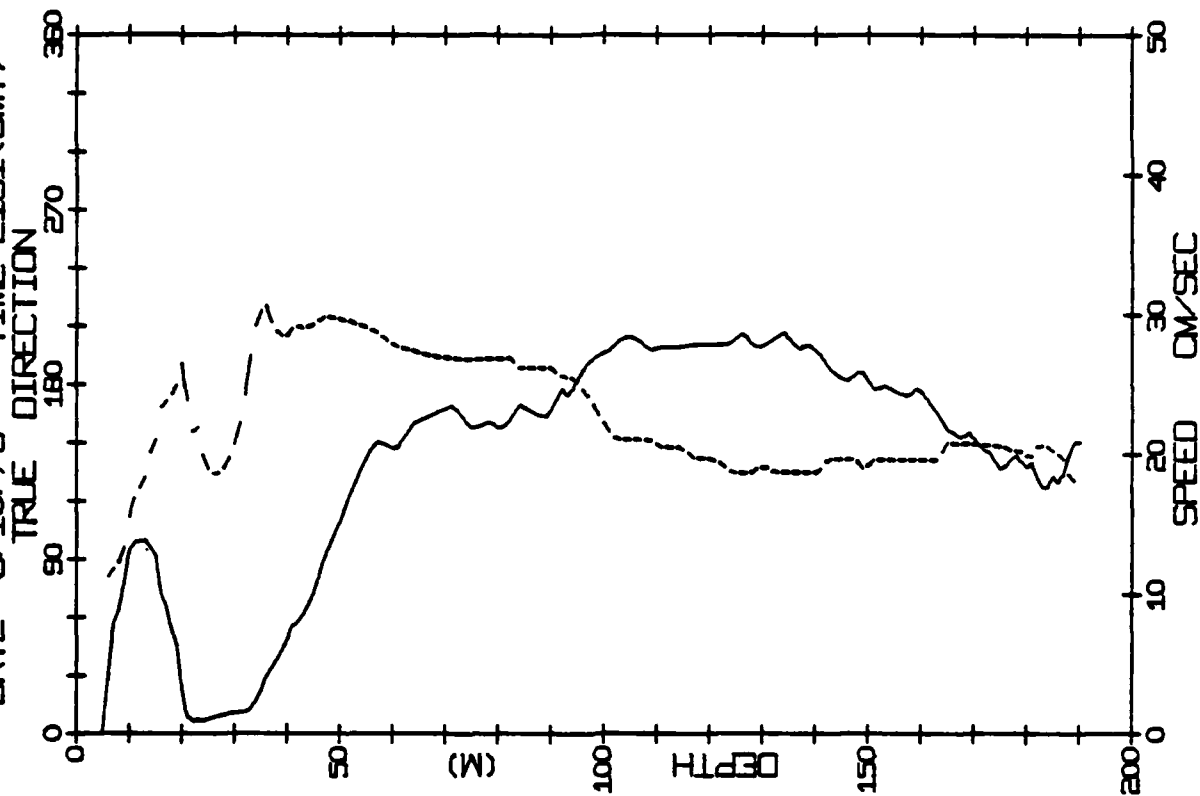
CAMP BLUE FOX STATION 318
 DATE 7/10/75 TIME 2123(GMT)



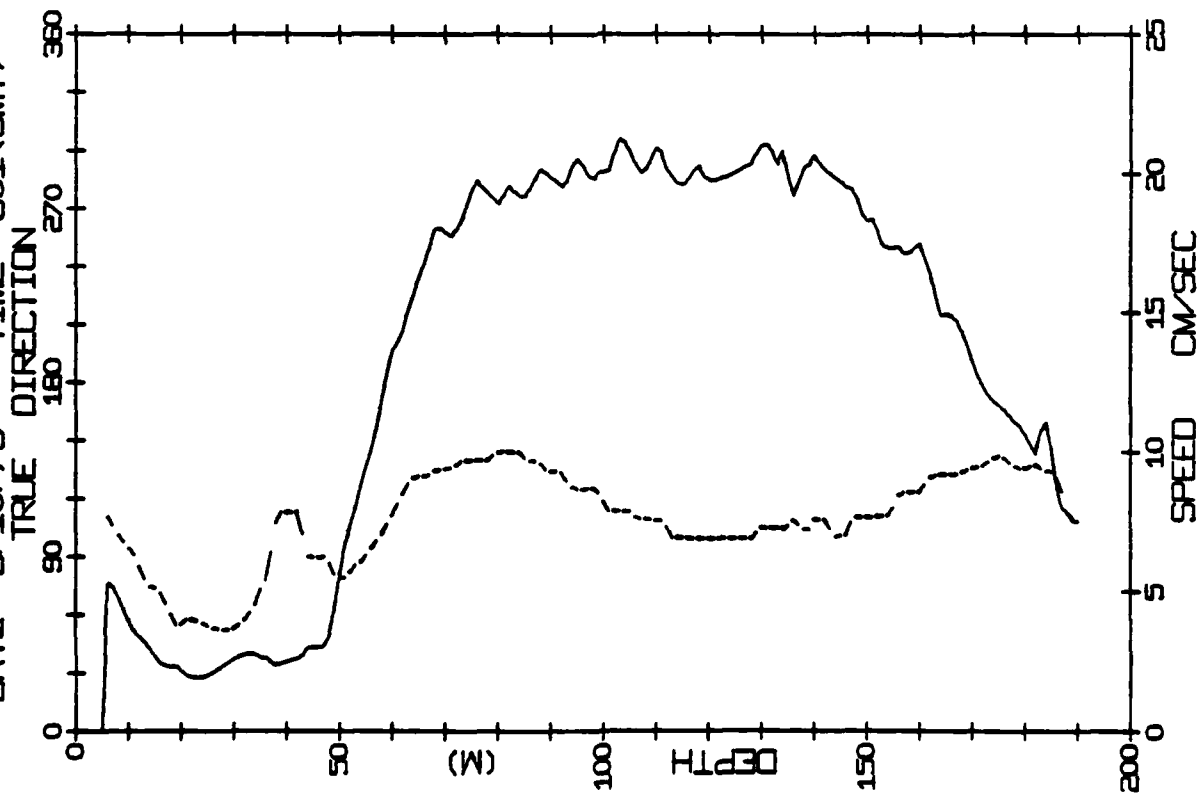
CAMP BLUE FOX STATION 317
 DATE 7/10/75 TIME 559(GMT)



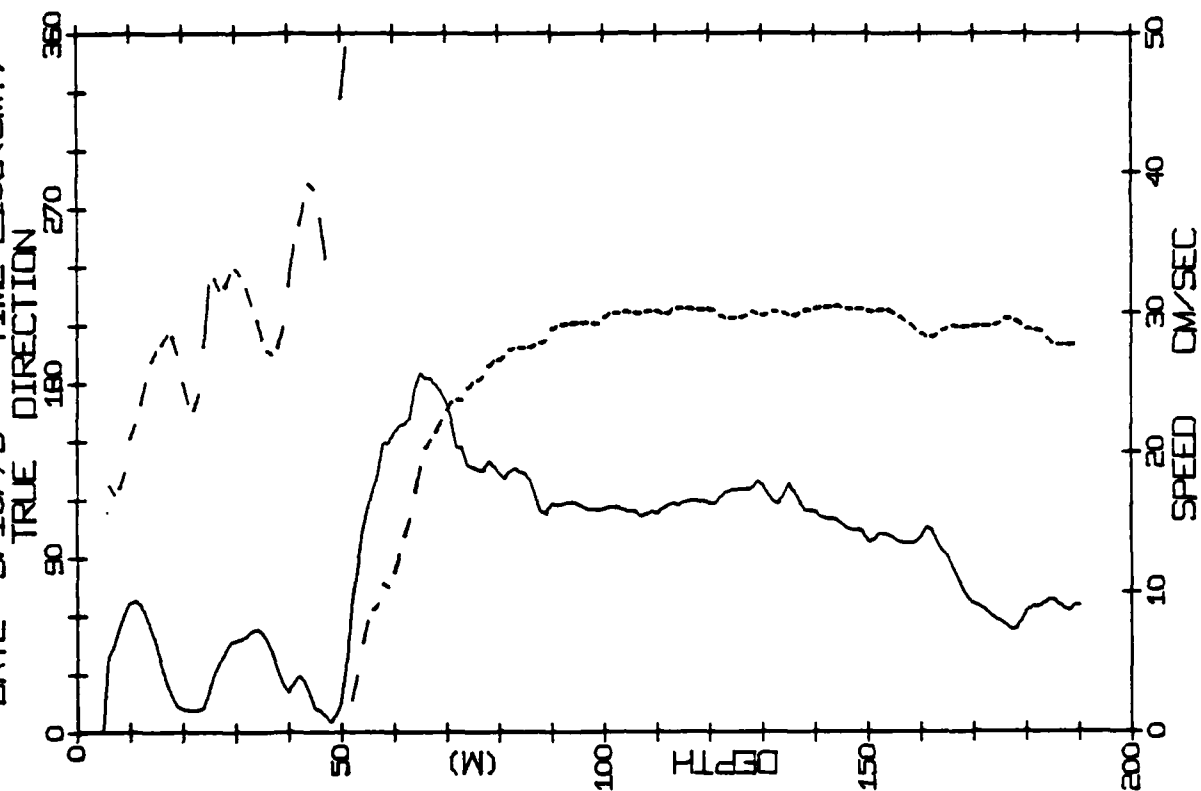
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DATE 8/10/75 TIME 2131 (GMT)



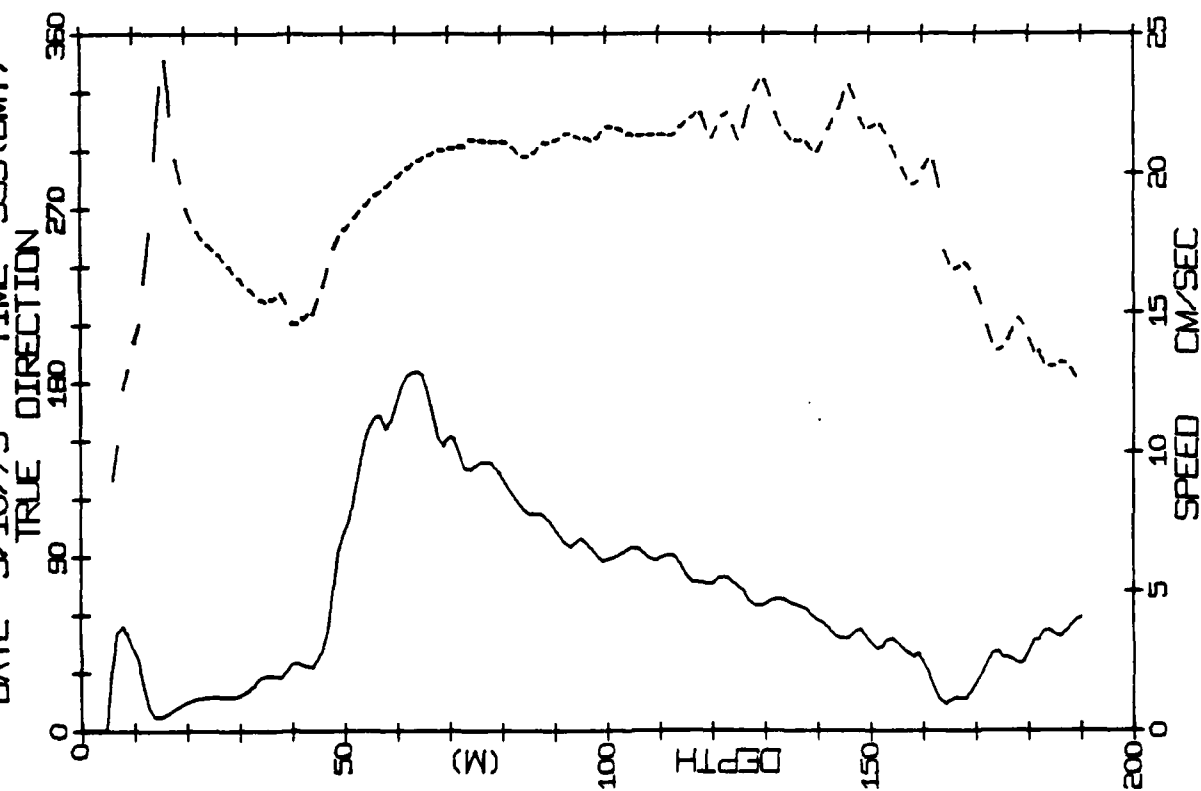
CAMP BLUE FOX STATION 319
DATE 8/10/75 TIME 601 (GMT)

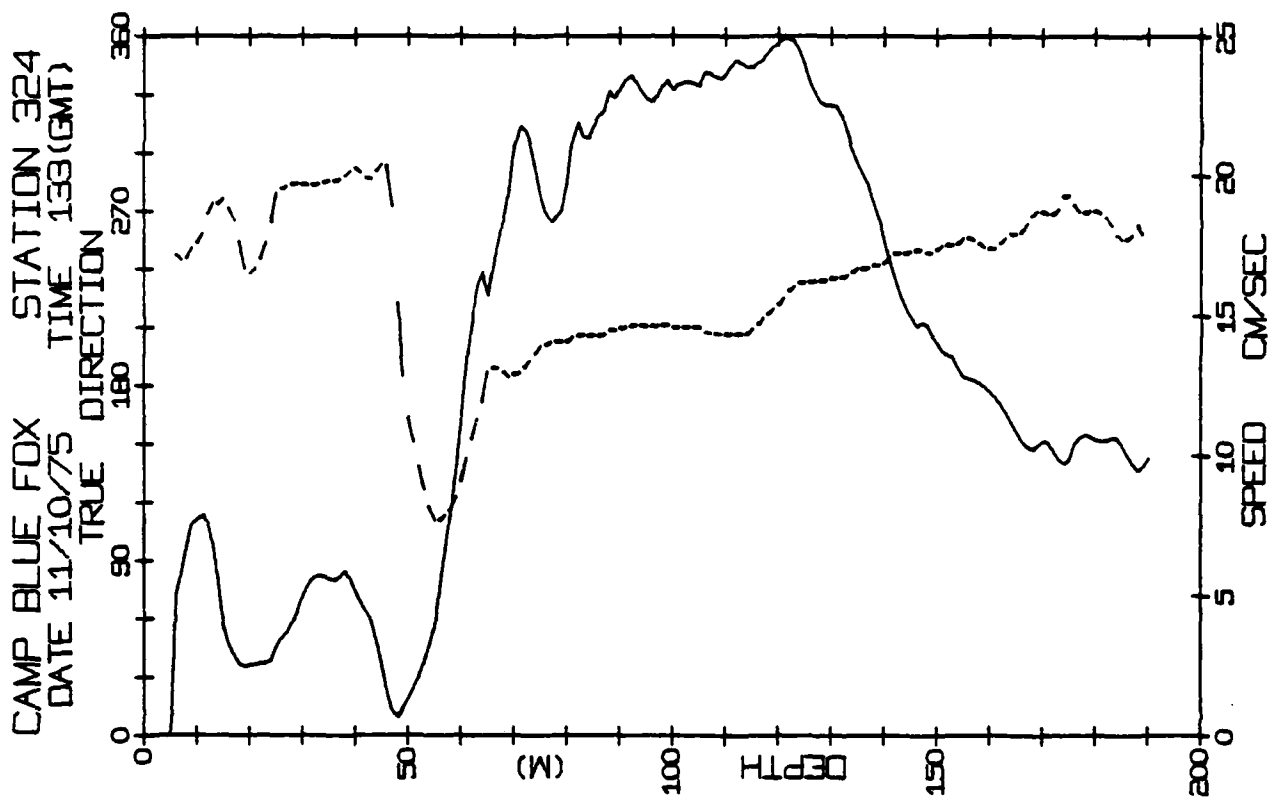
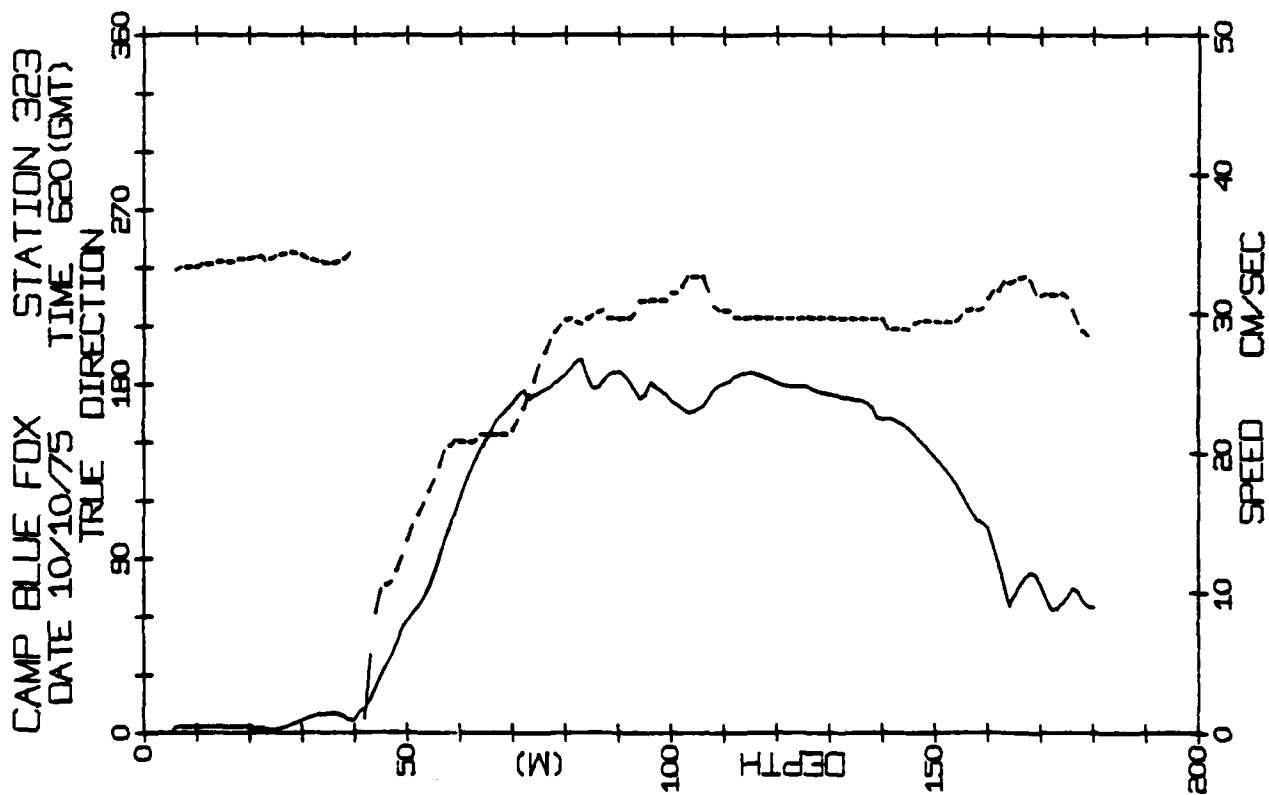


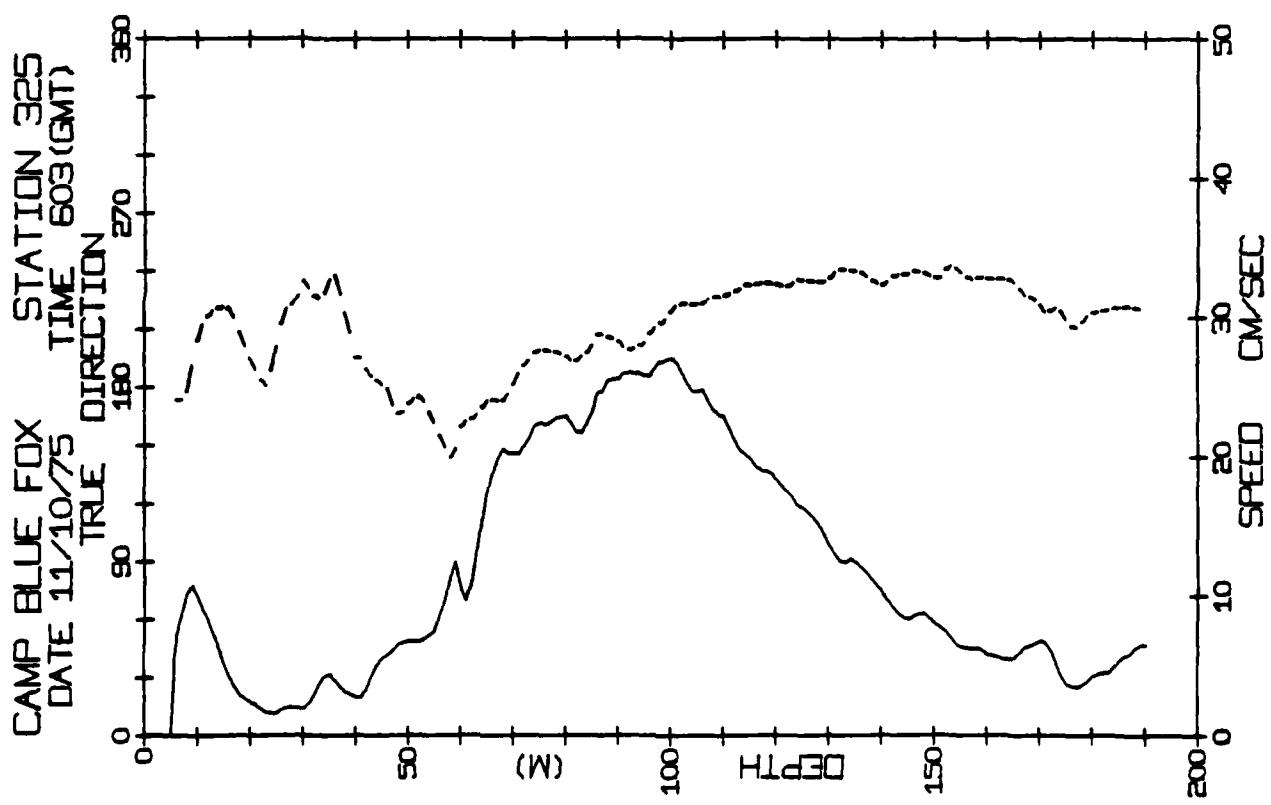
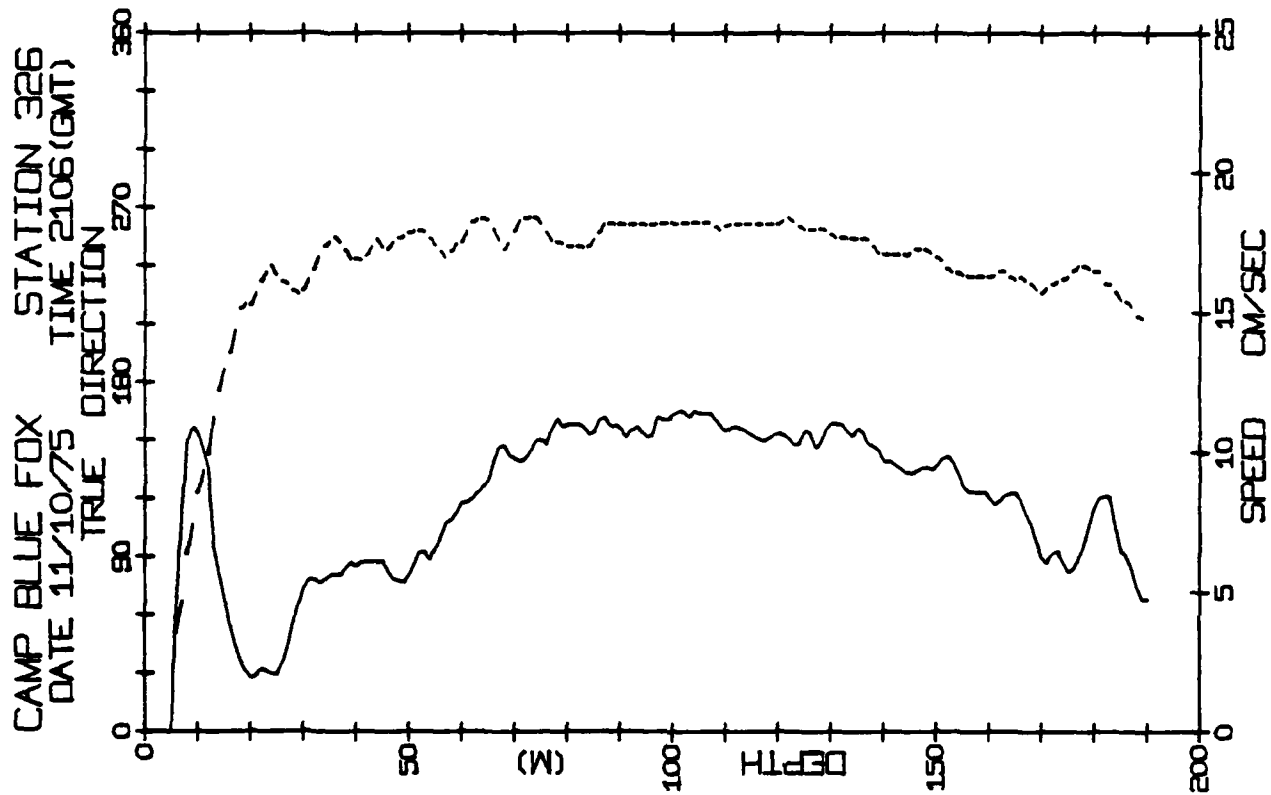
CAMP BLUE FOX STATION 322
DATE 9/10/75 TIME 2108 (GMT)

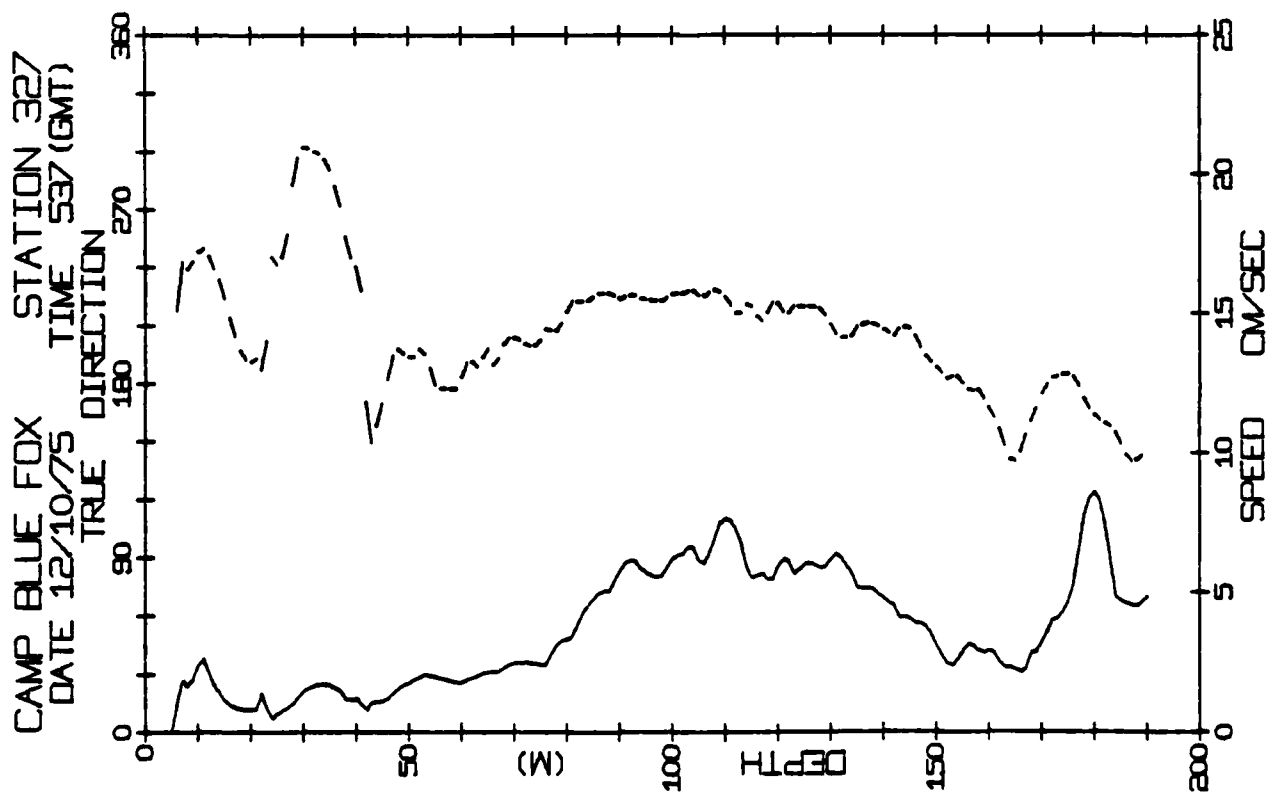
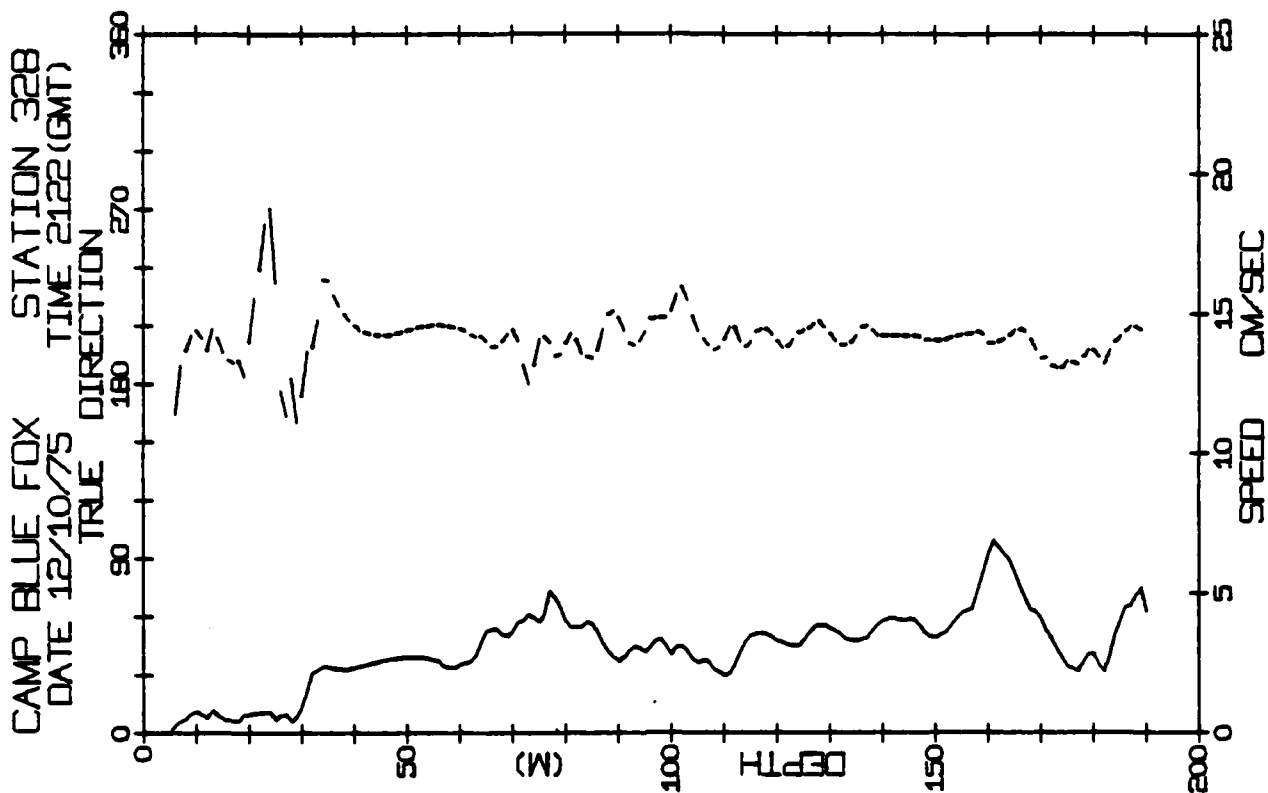


CAMP BLUE FOX STATION 321
DATE 9/10/75 TIME 535 (GMT)

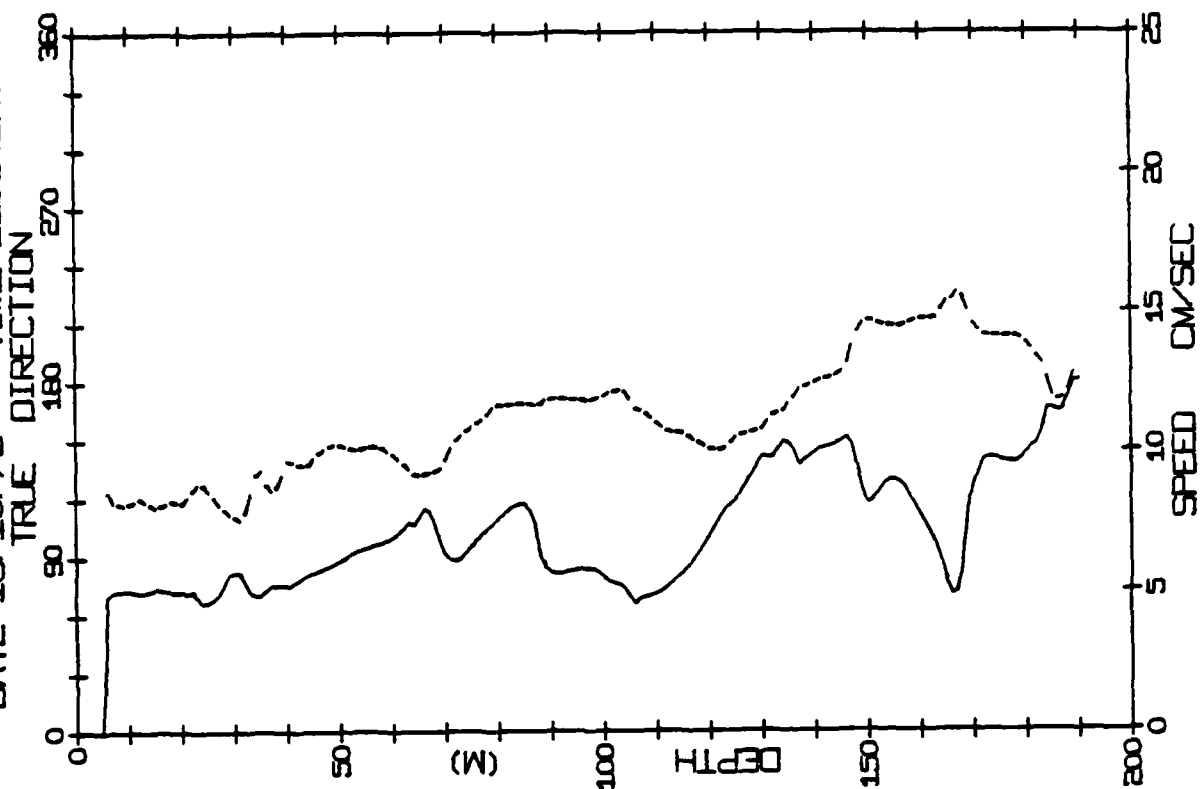




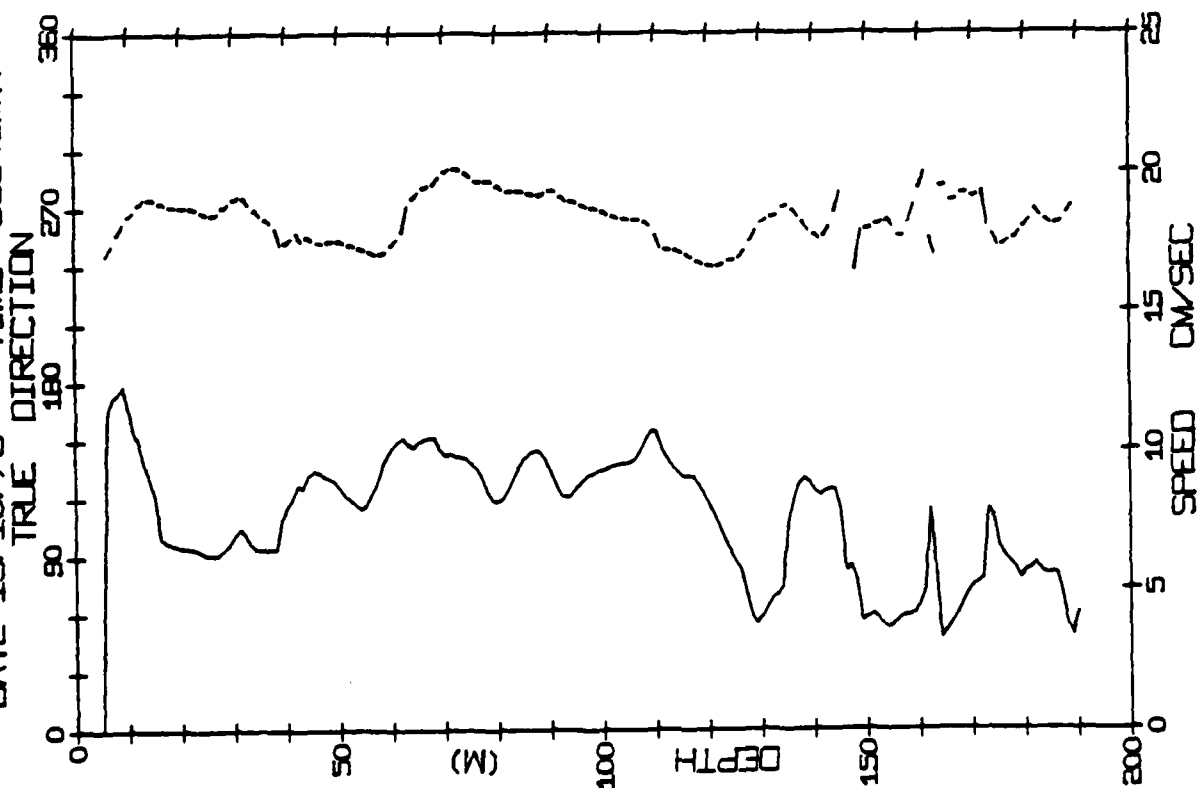


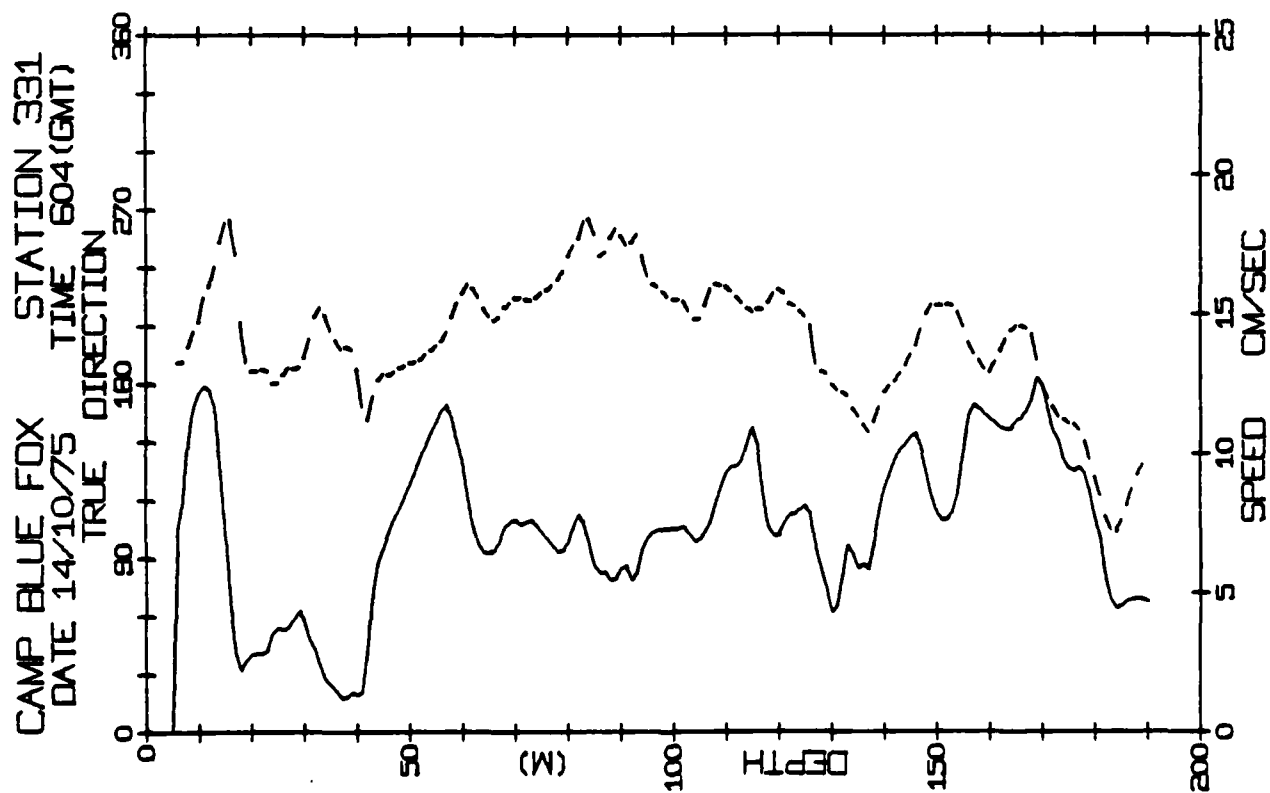
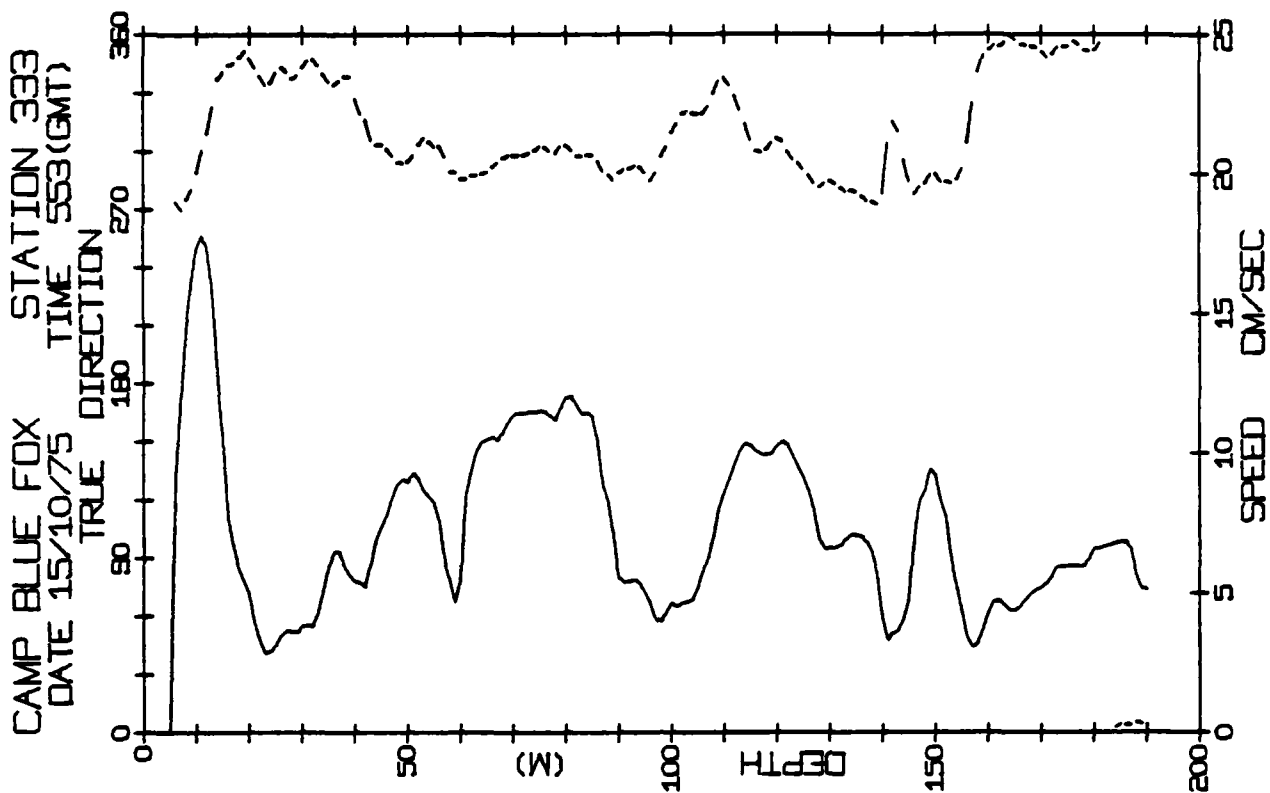


CAMP BLUE FOX STATION 330
DATE 13/10/75 TIME 2103 (GMT)

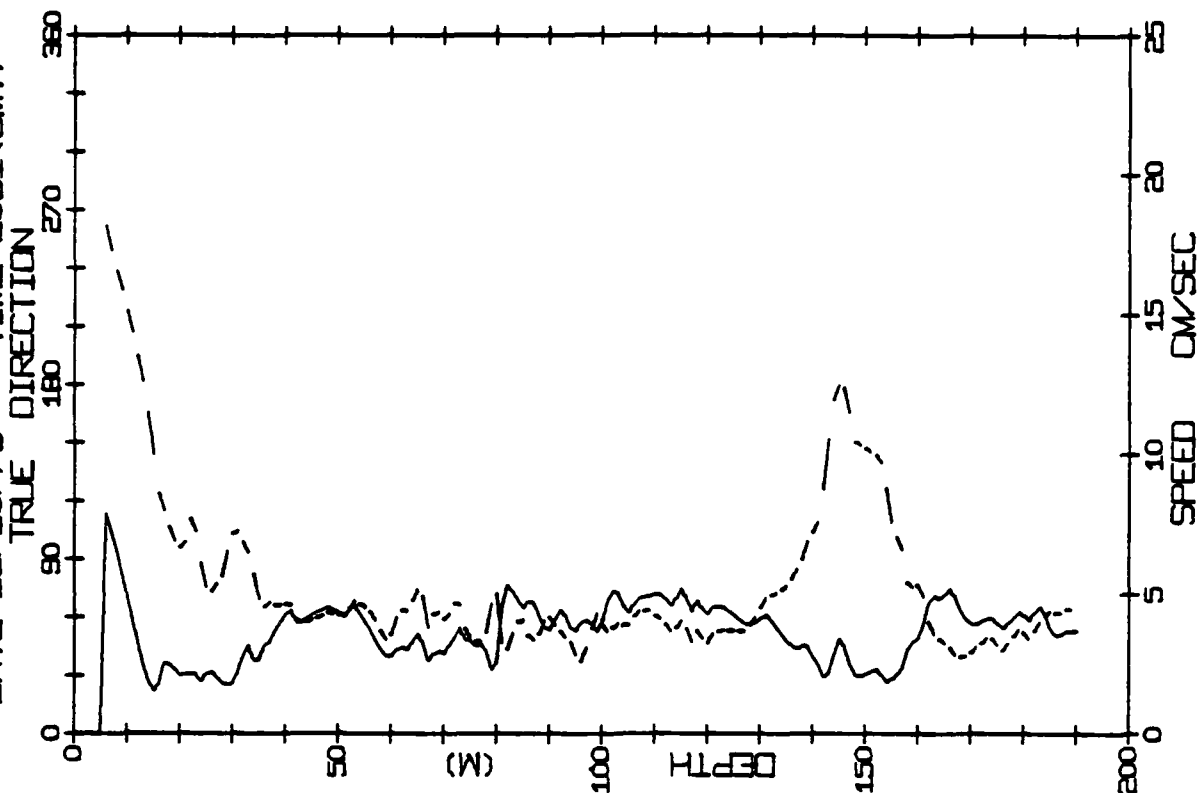


CAMP BLUE FOX STATION 329
DATE 13/10/75 TIME 536 (GMT)

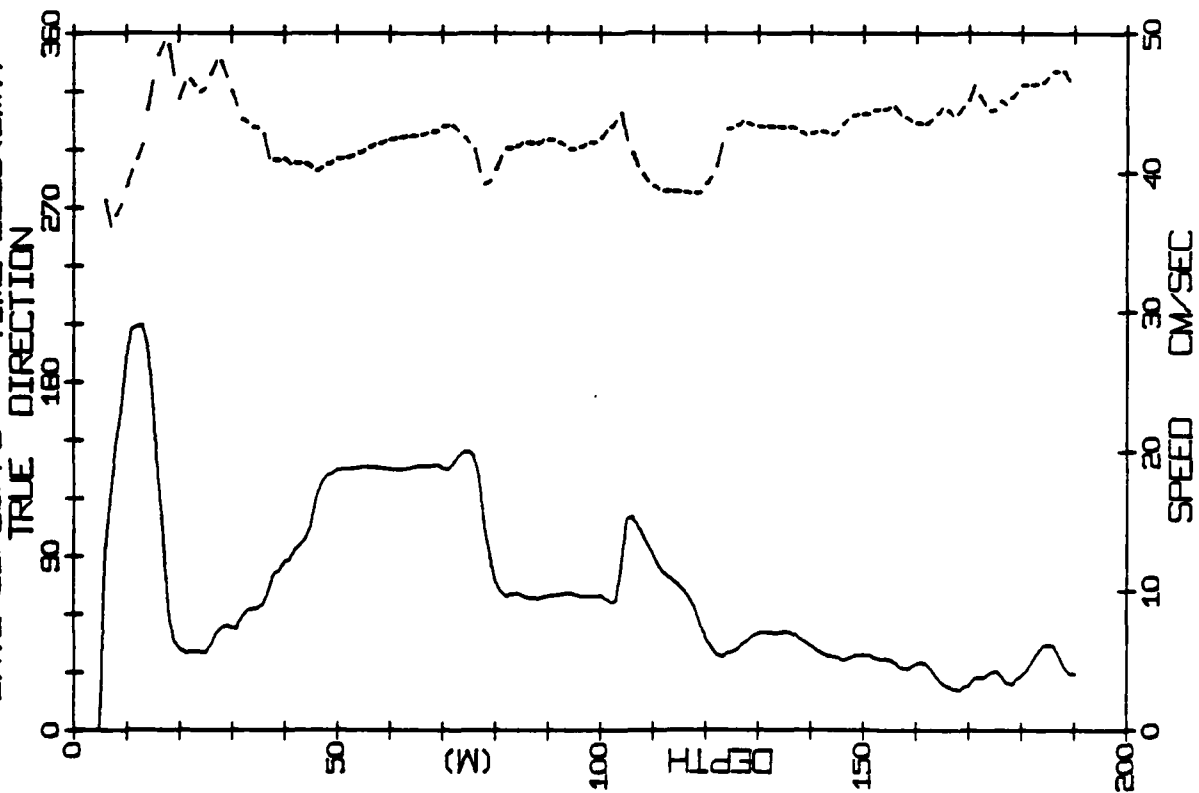




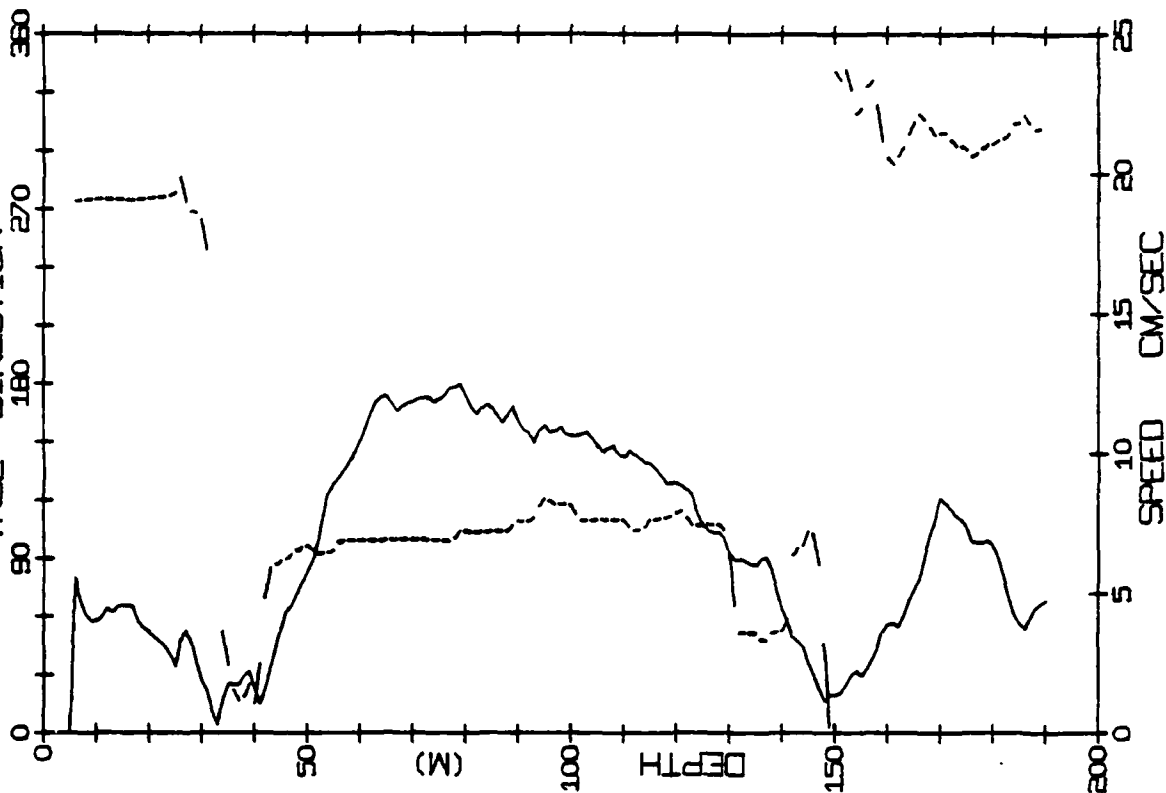
CAMP BLUE FOX STATION 336
DATE 16/10/75 TIME 2051 (GMT)



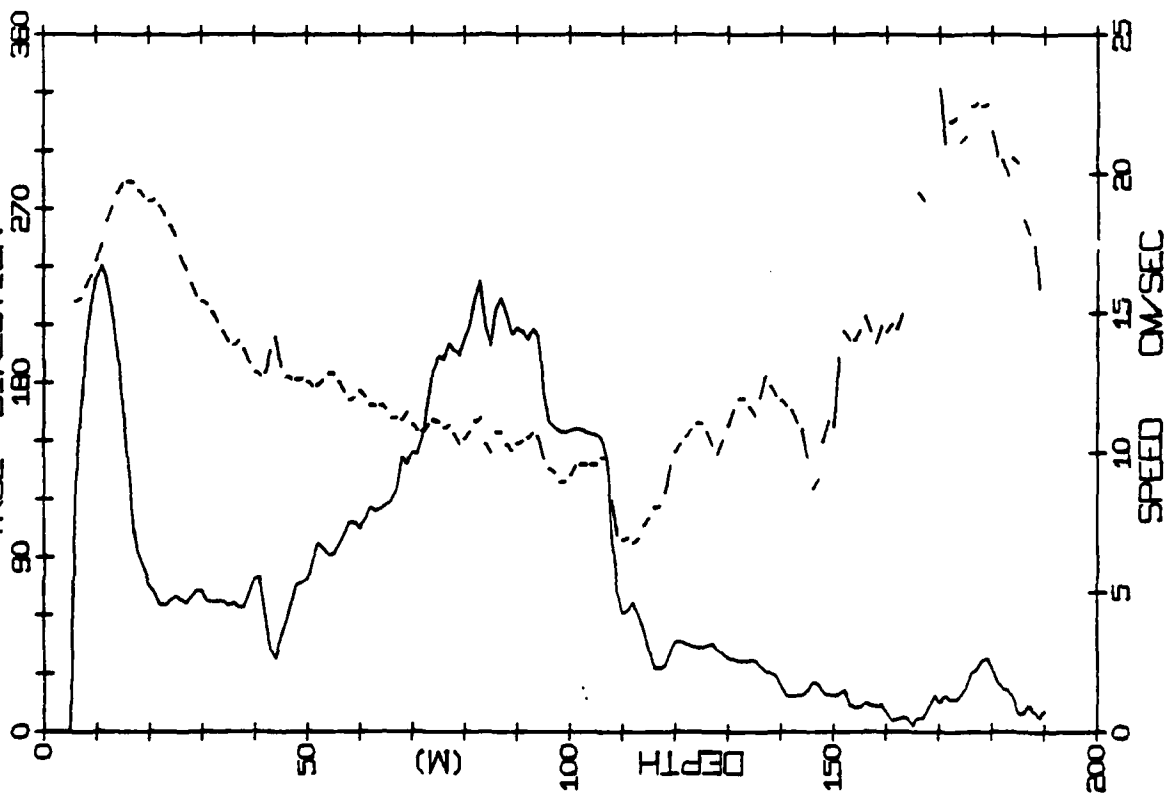
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DATE 15/10/75 TIME 2115 (GMT)

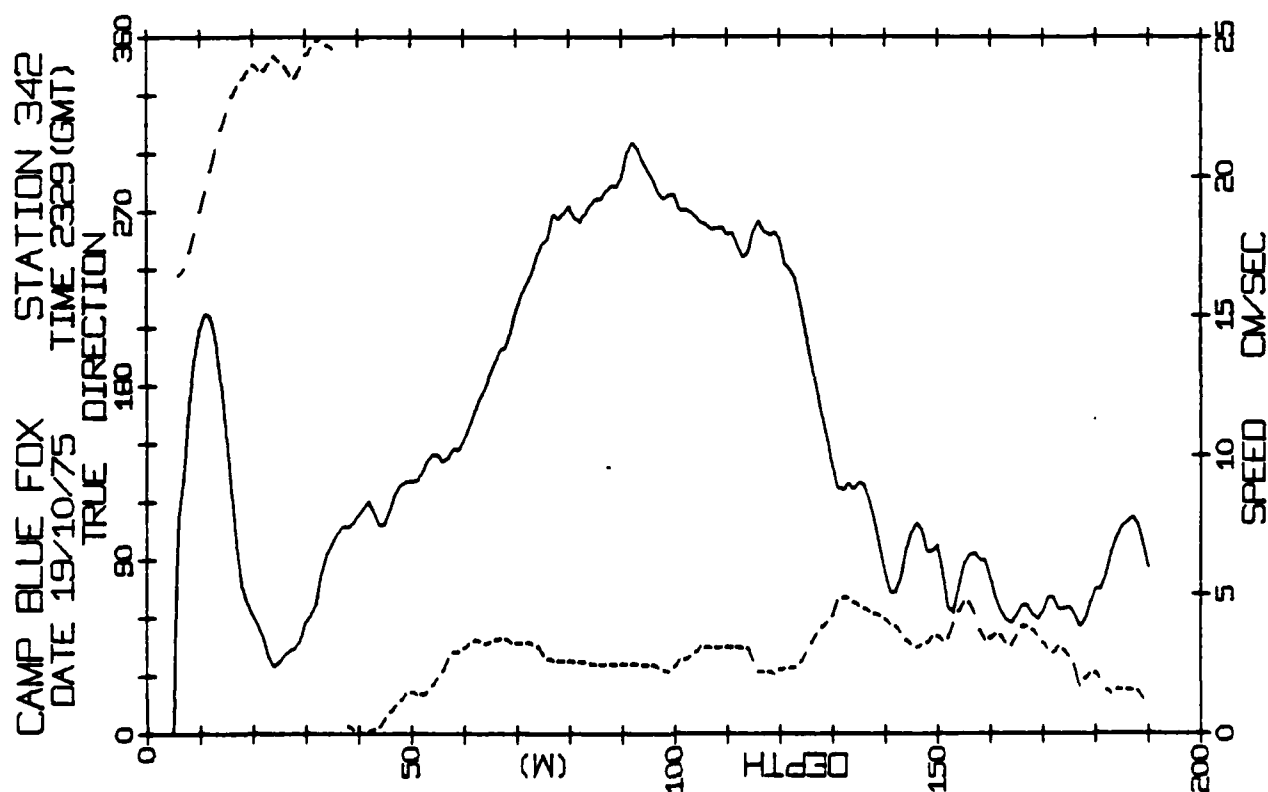
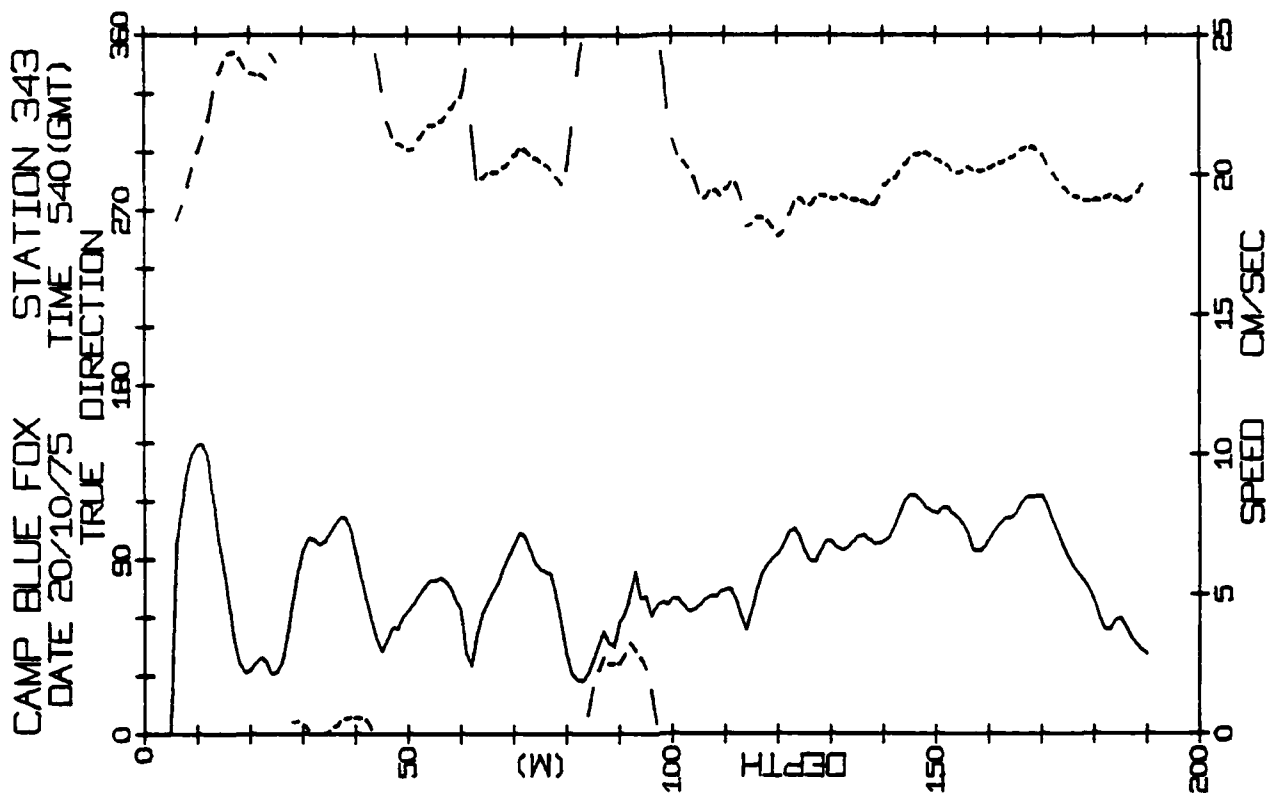


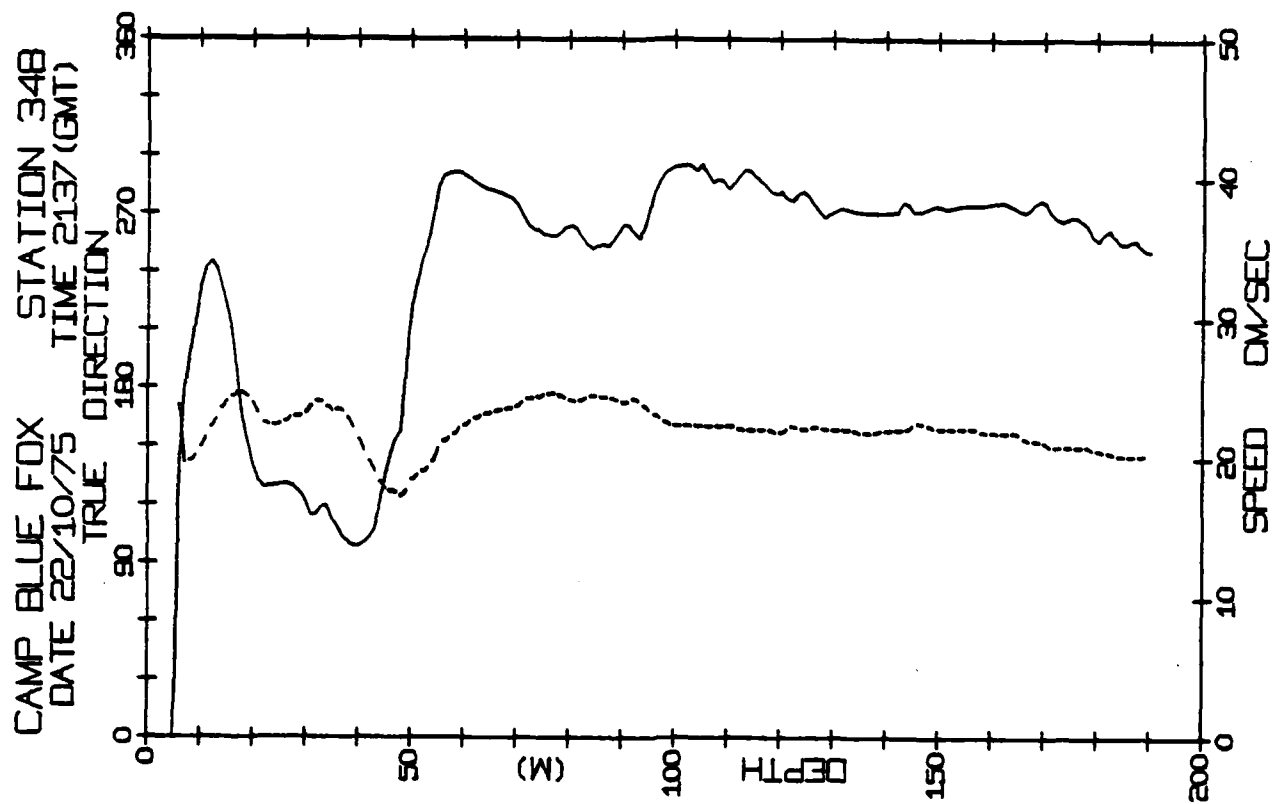
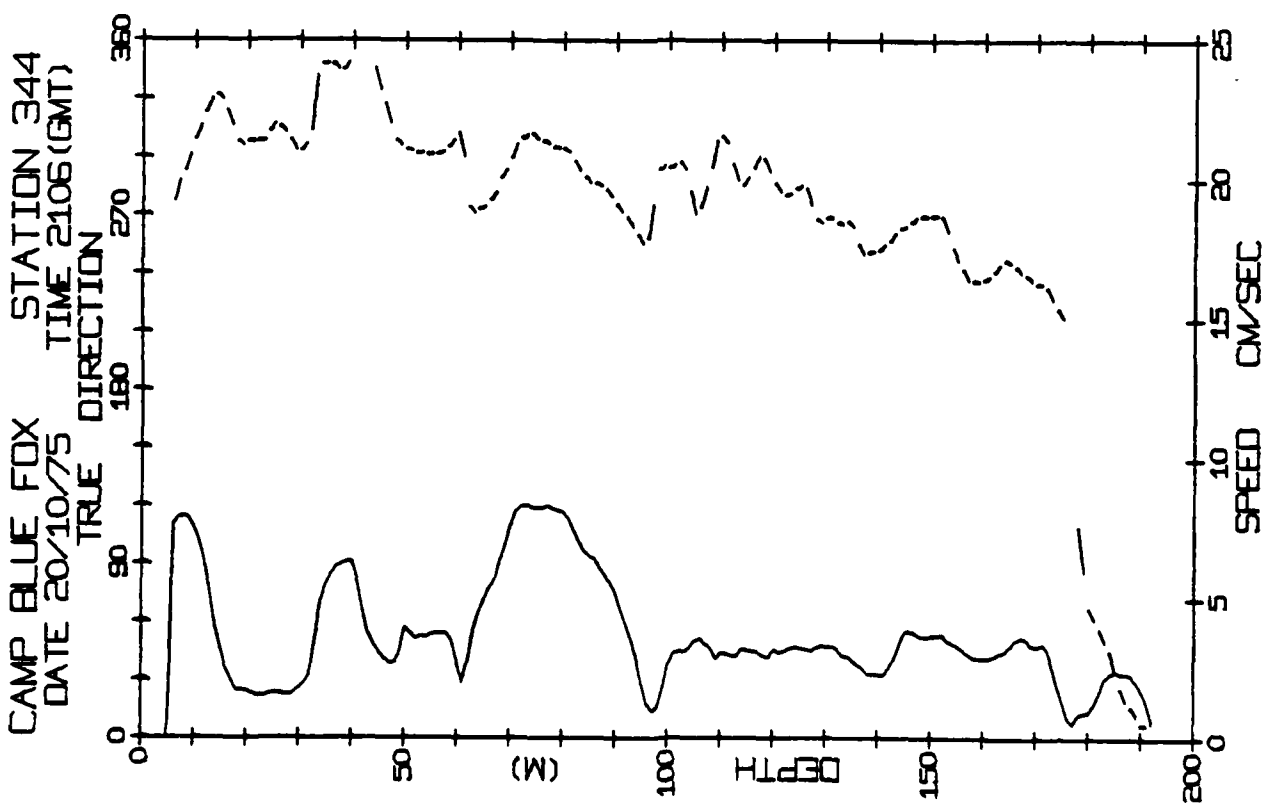
CAMP BLUE FOX STATION 341
 DATE 15/10/75 TIME 608(GMT)
 TRUE DIRECTION



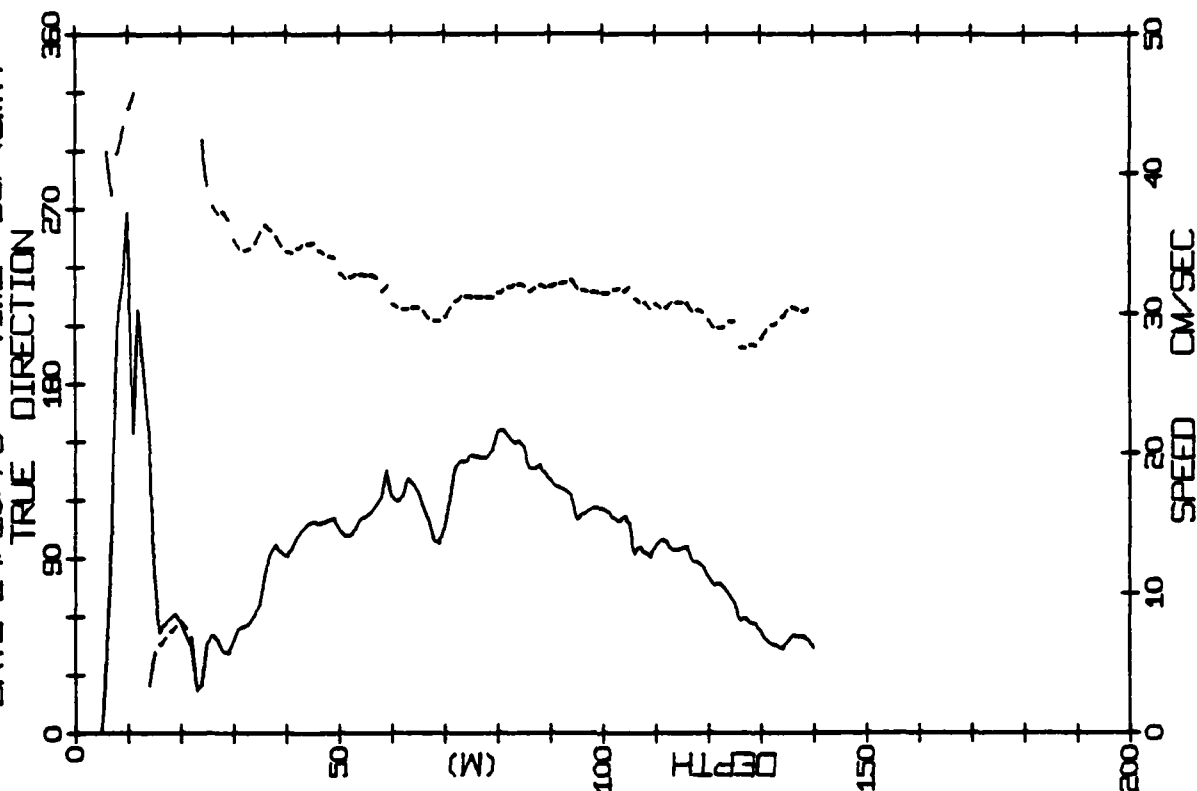
CAMP BLUE FOX STATION 340
 DATE 18/10/75 TIME 2106(GMT)
 TRUE DIRECTION



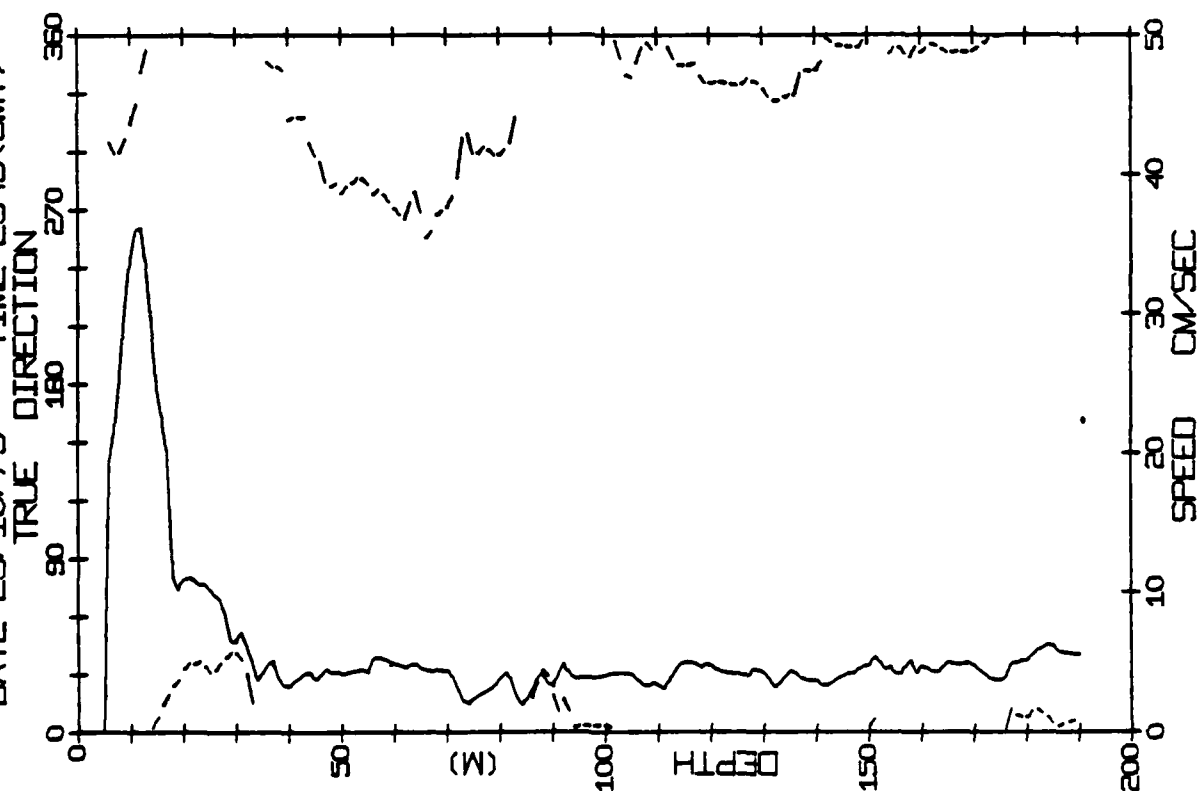




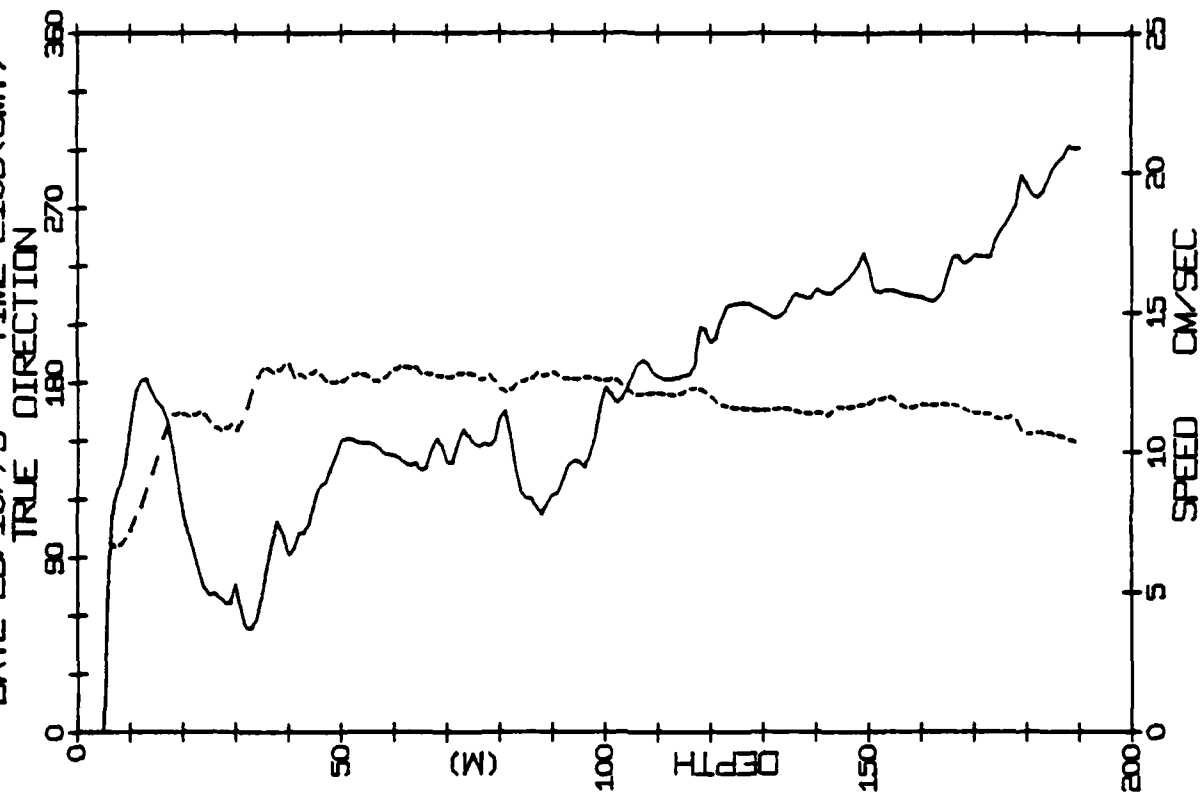
CAMP BLUE FOX STATION 351
DATE 24/10/75 TIME 537 (GMT)



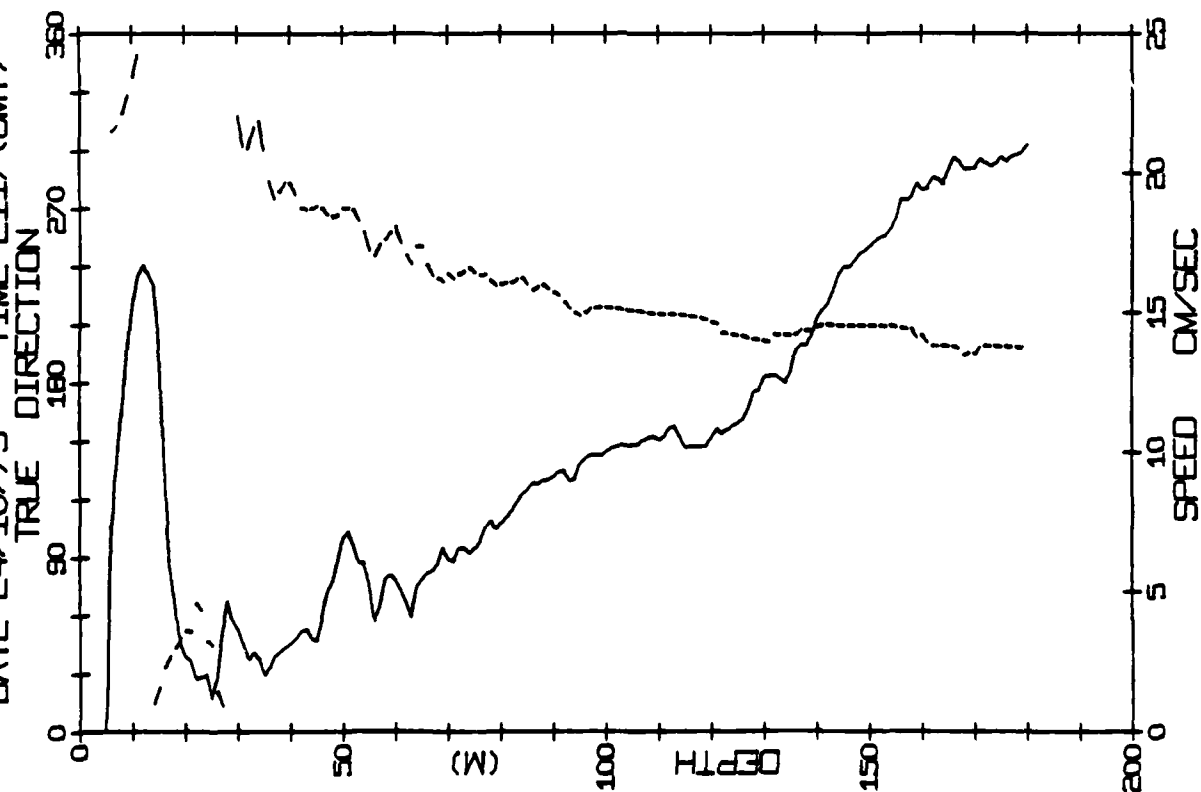
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DATE 23/10/75 TIME 2345 (GMT)



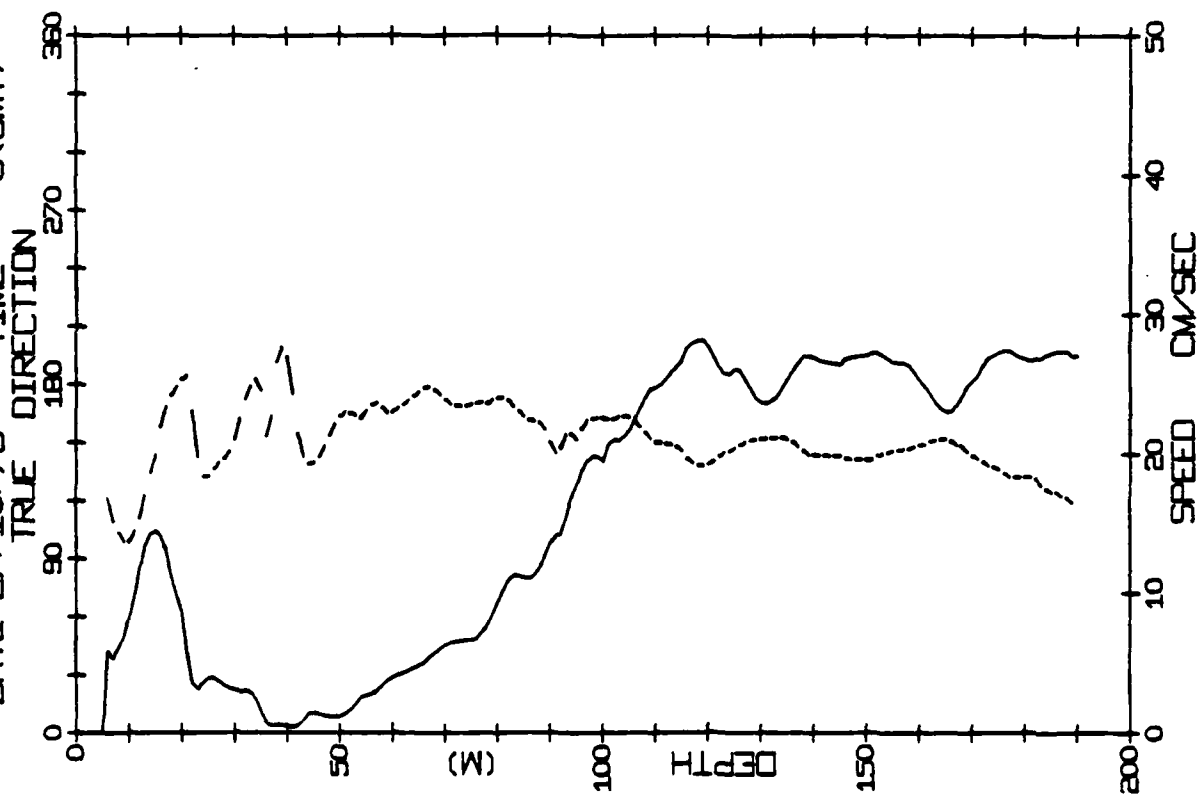
CAMP BLUE FOX STATION 353
 DATE 25/10/75 TIME 2109(GMT)



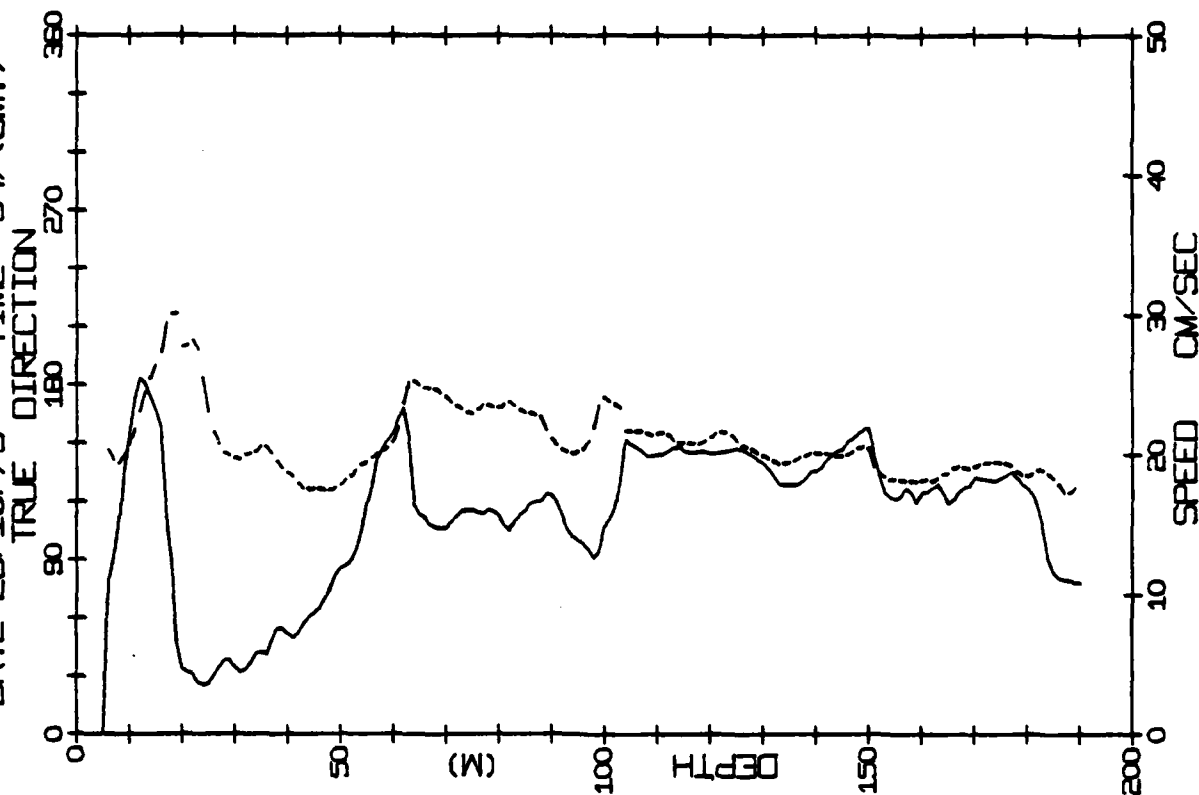
CAMP BLUE FOX STATION 352
 DATE 24/10/75 TIME 2117(GMT)



CAMP BLUE FOX STATION 355
DATE 27/10/75 TIME 6 (GMT)

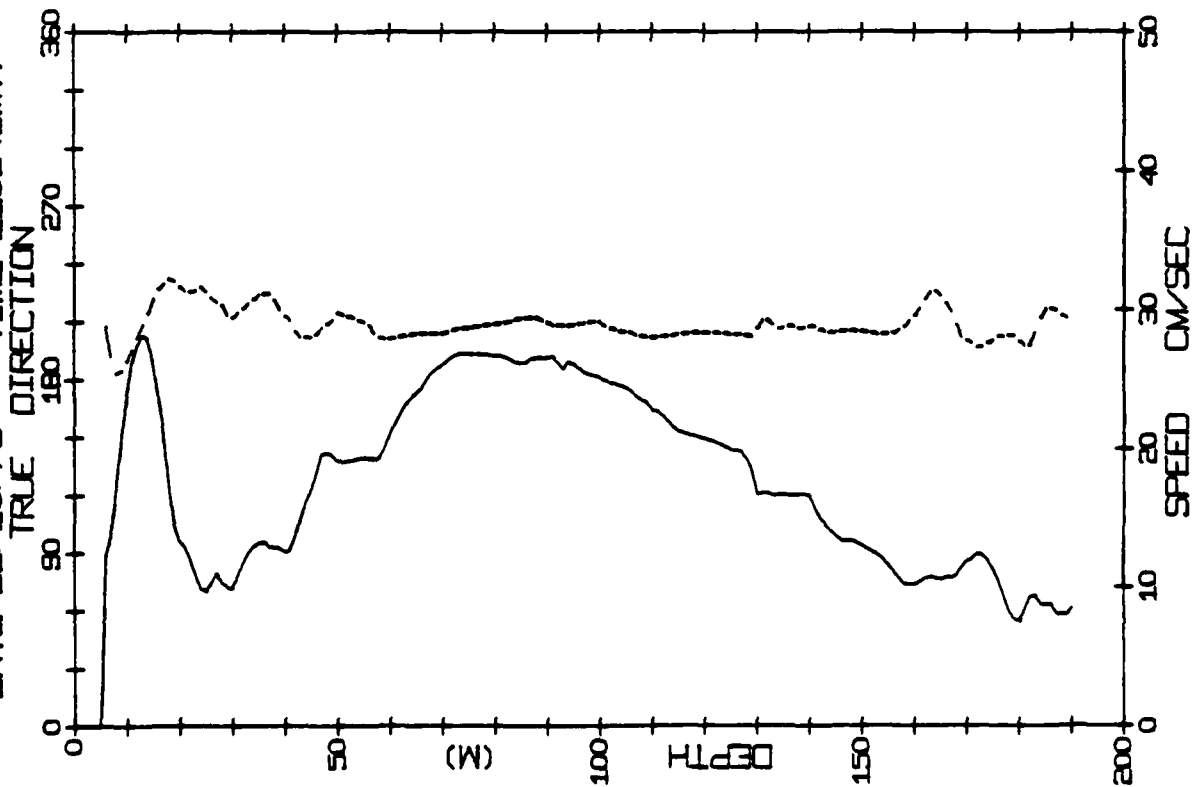


CAMP BLUE FOX STATION 358
DATE 28/10/75 TIME 547 (GMT)



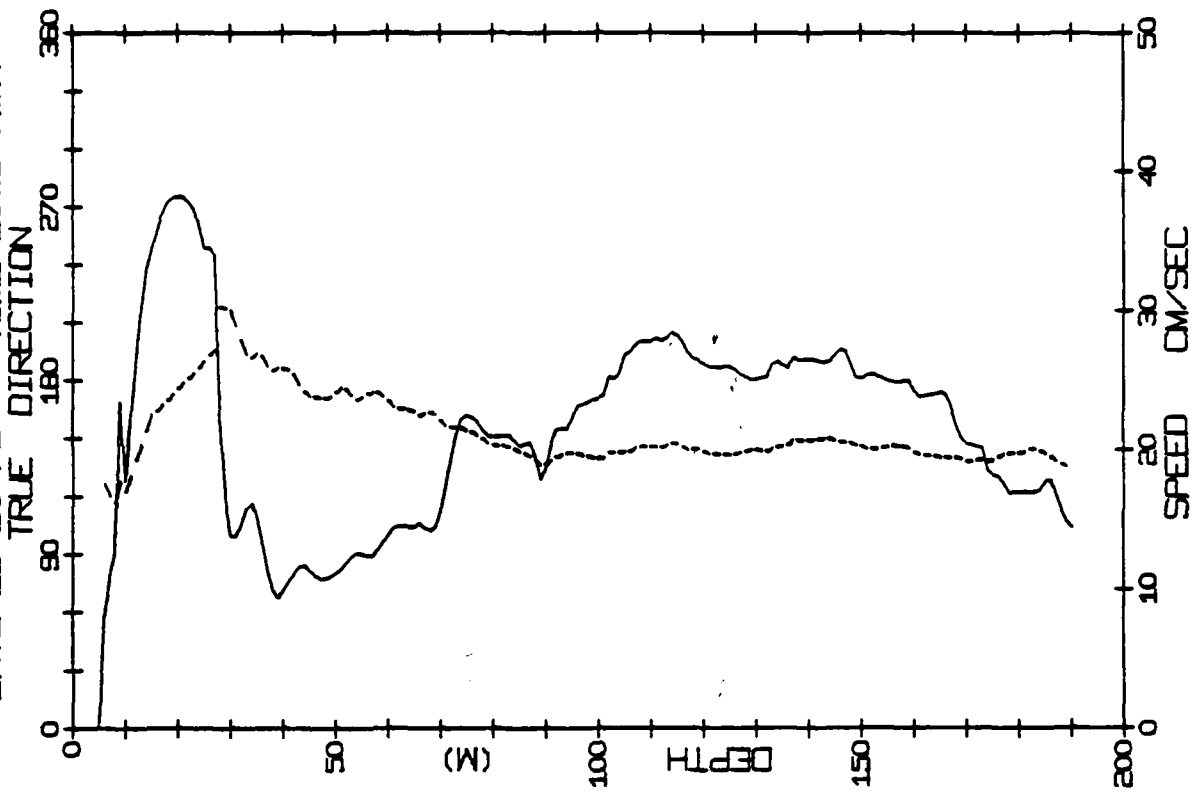
CAMP BLUE FOX
DATE 28/10/75

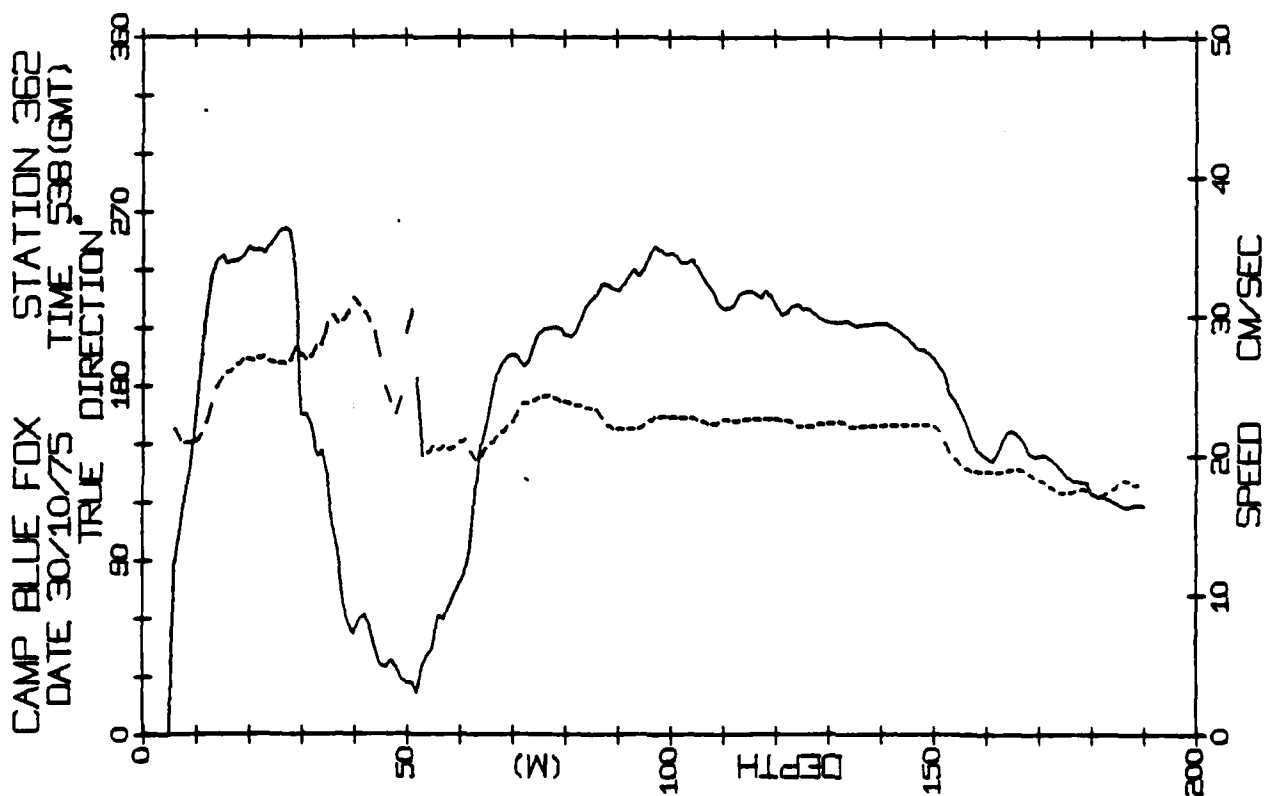
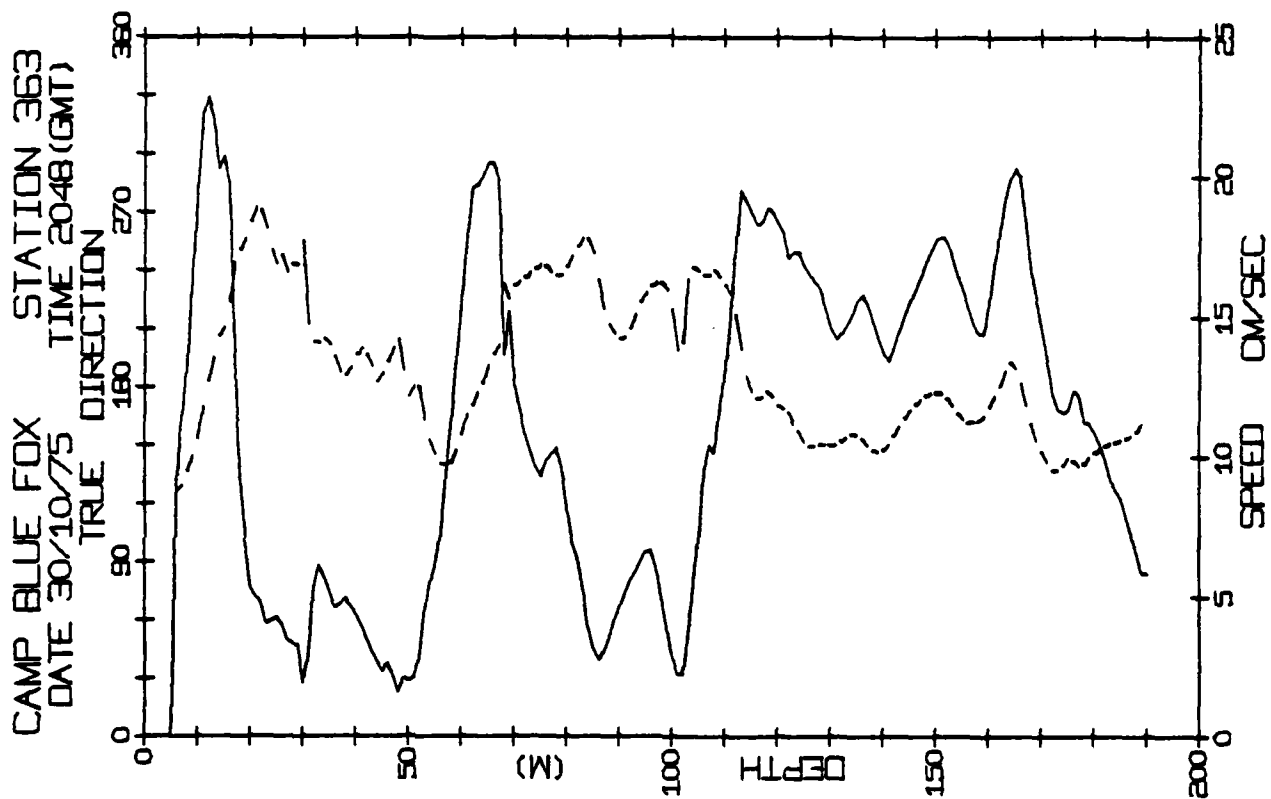
STATION 359
TIME 2108 (GMT)



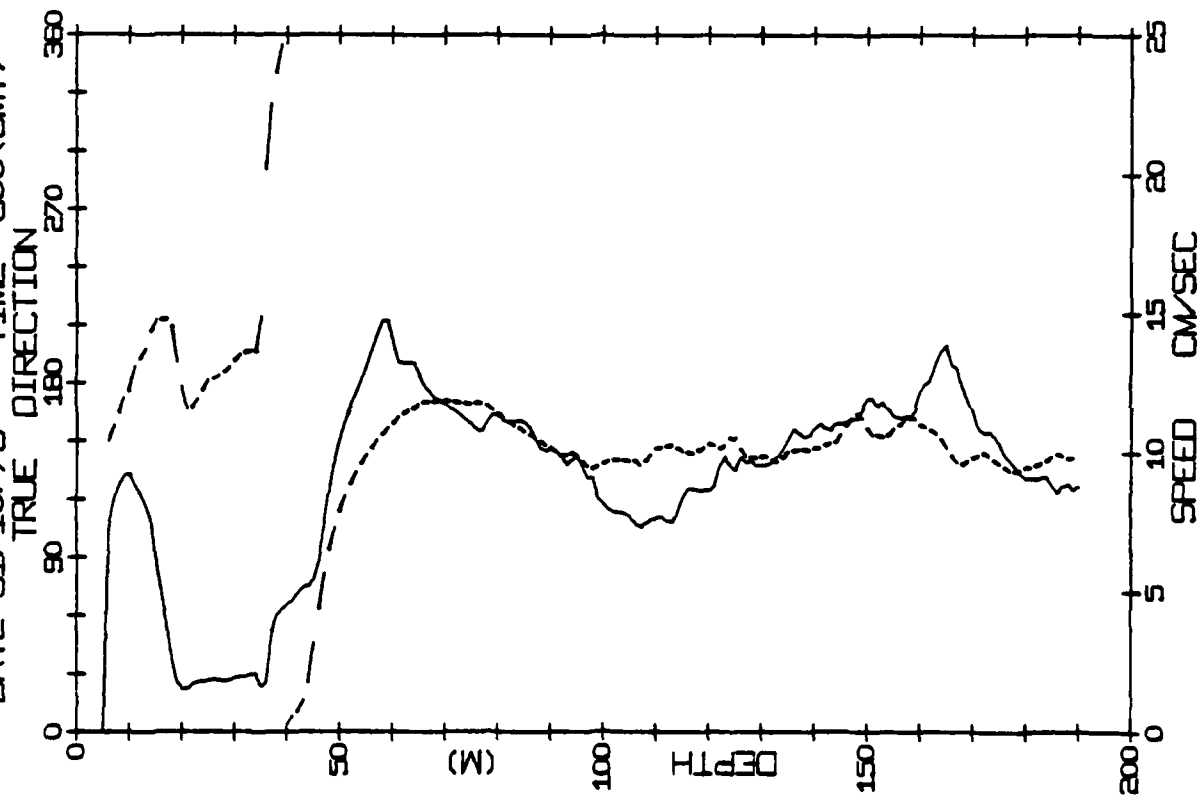
CAMP BLUE FOX
DATE 29/10/75

STATION 361
TIME 2135 (GMT)

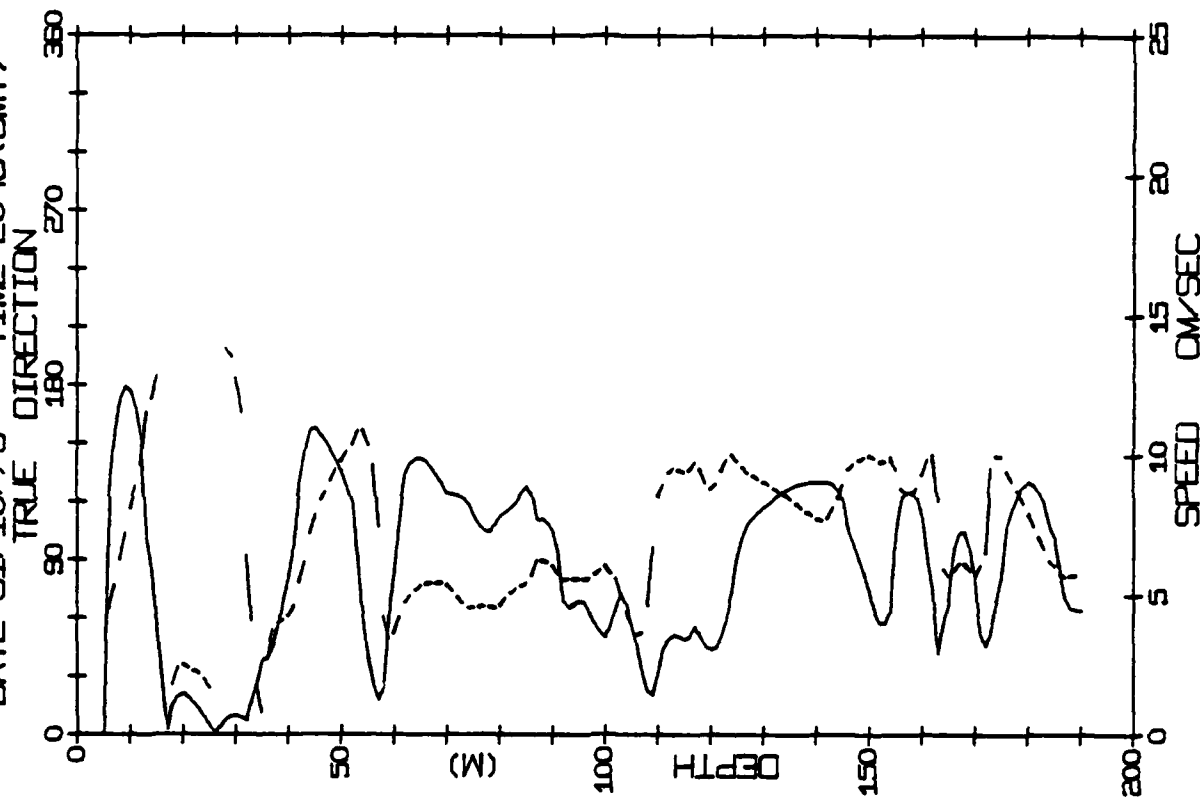




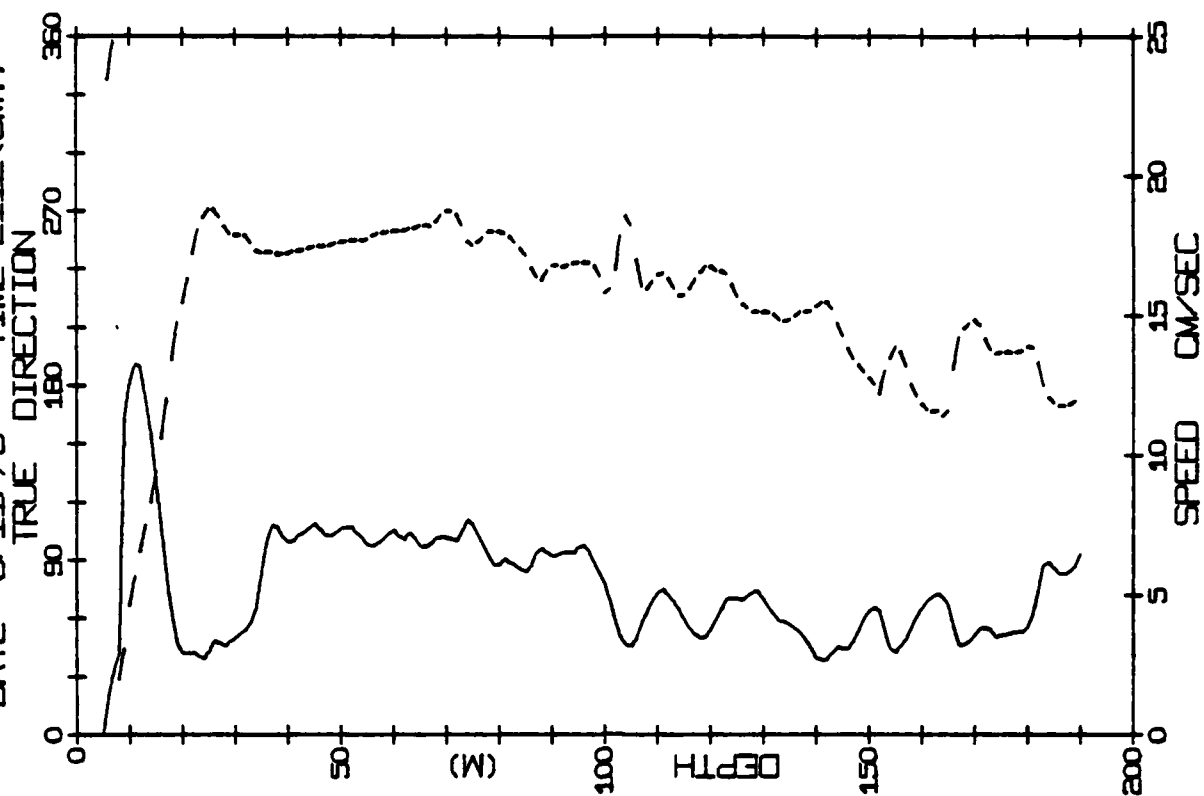
CAMP BLUE FOX STATION 364
DATE 31/10/75 TIME 600 (GMT)



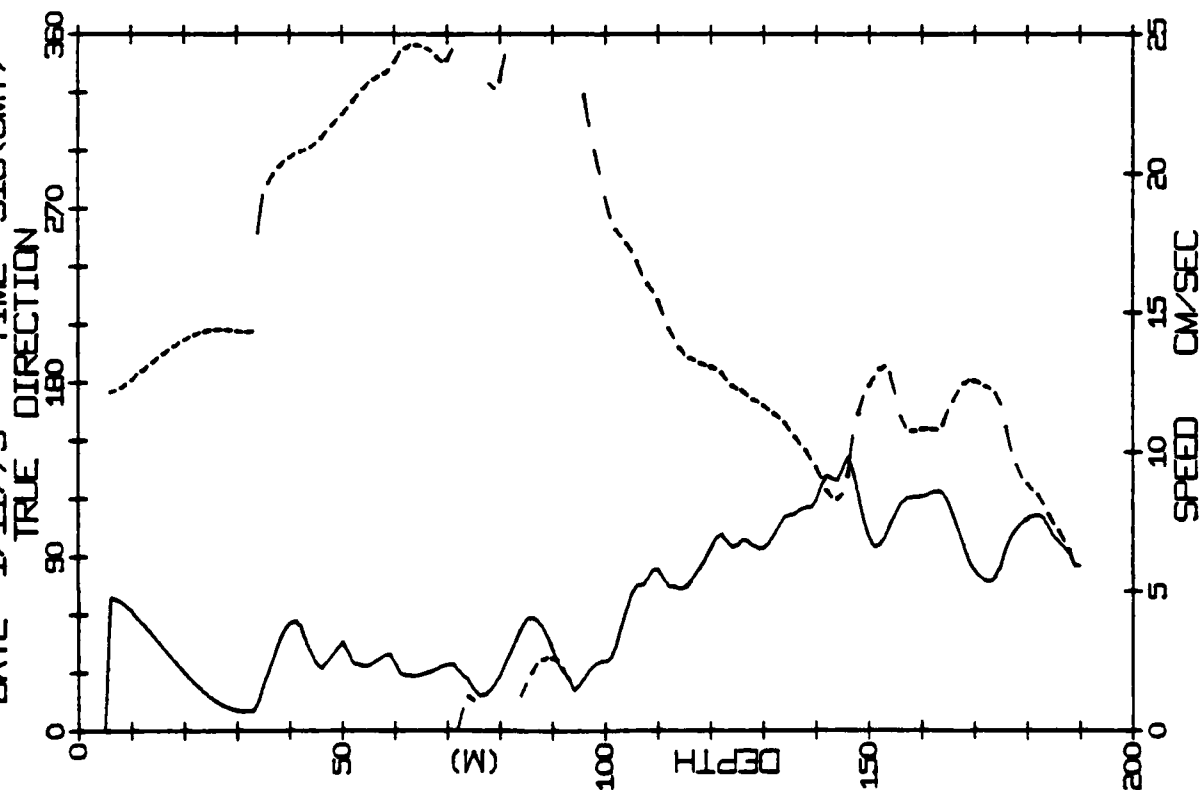
CAMP BLUE FOX STATION 365
DATE 31/10/75 TIME 2048 (GMT)



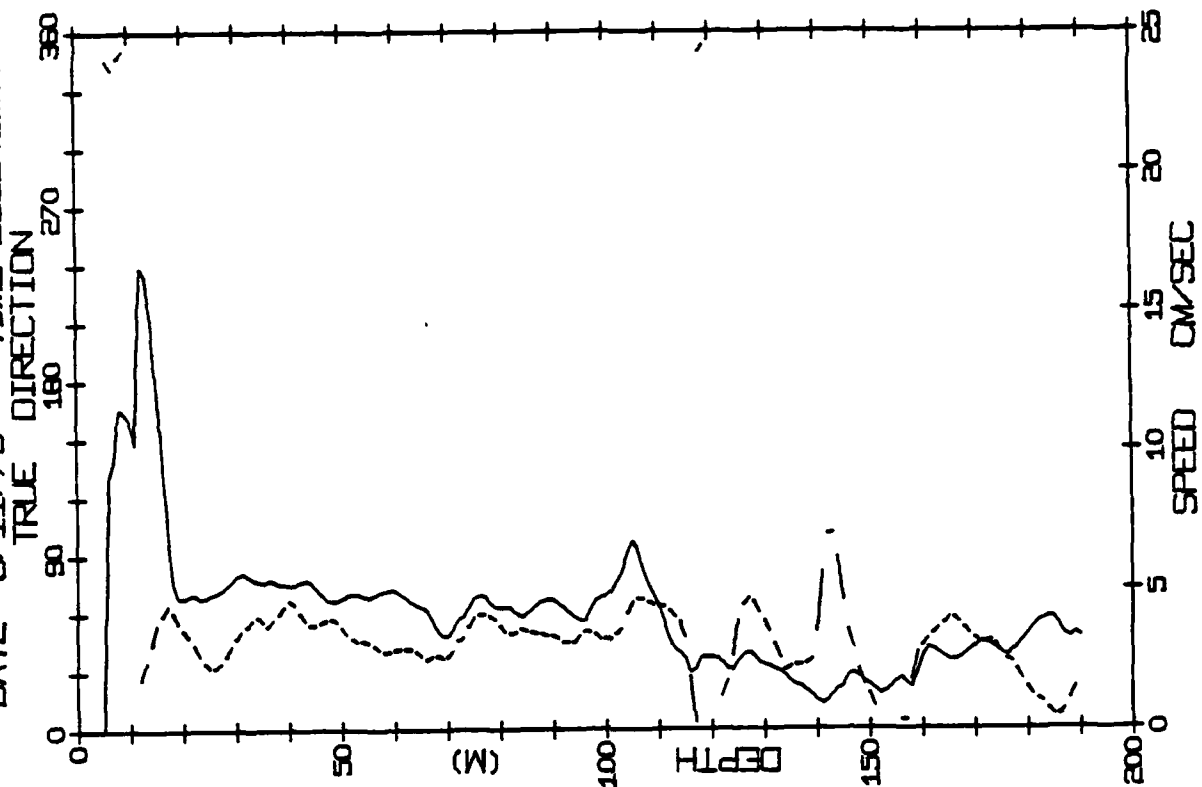
CAMP BLUE FOX STATION 377
DATE 6/11/75 TIME 2112(GMT)



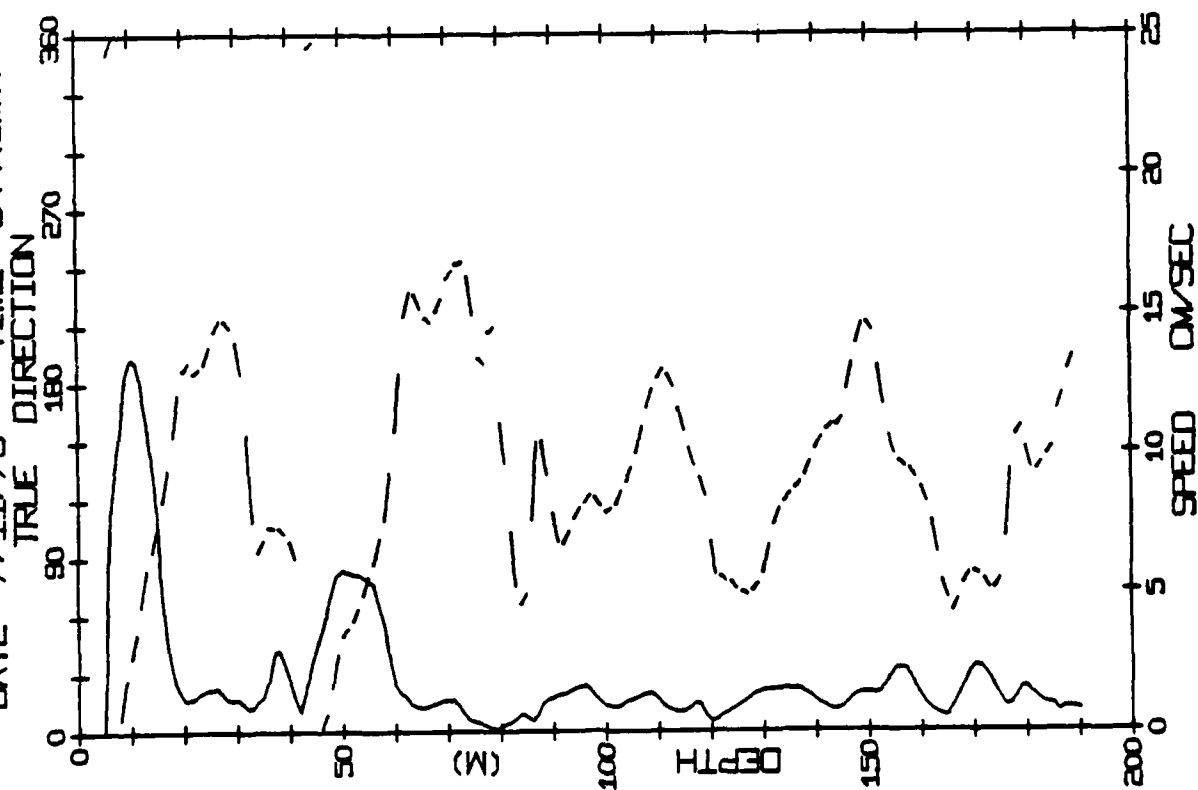
CAMP BLUE FOX STATION 366
DATE 1/11/75 TIME 518(GMT)



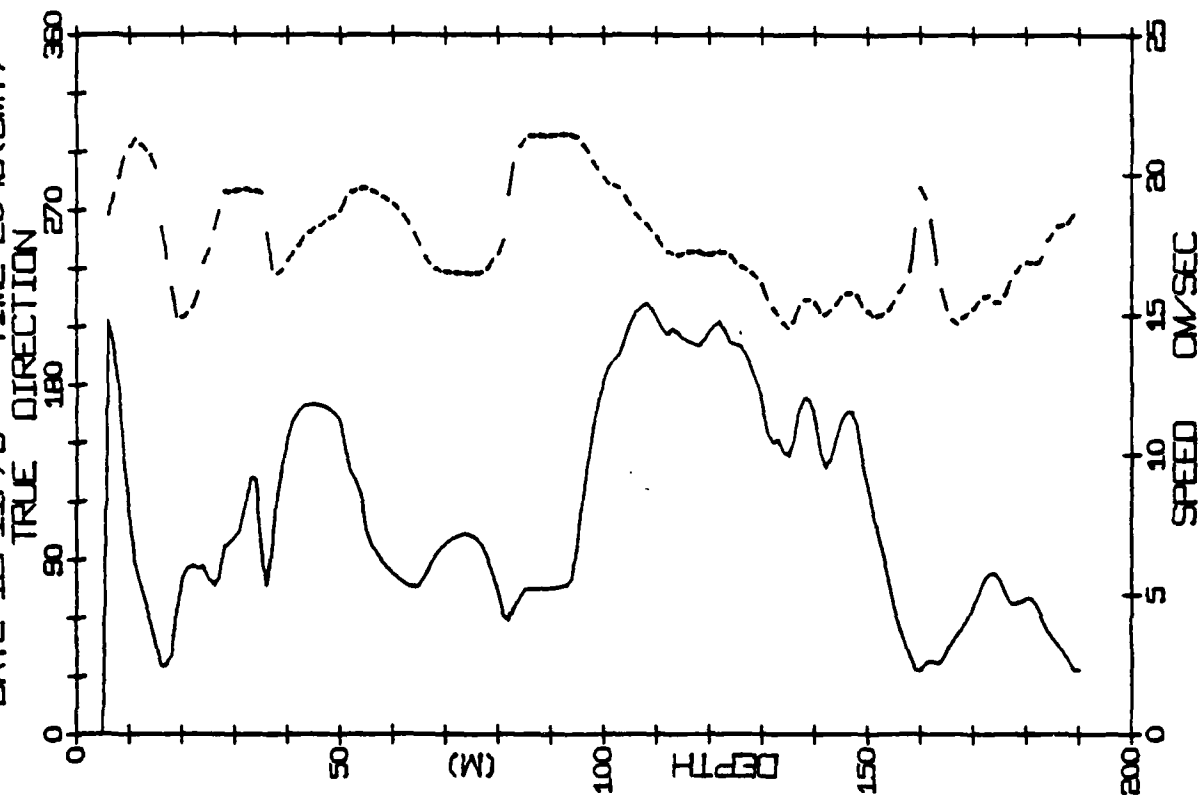
CAMP BLUE FOX STATION 381
DATE 8/11/75 TIME 2112(GMT)



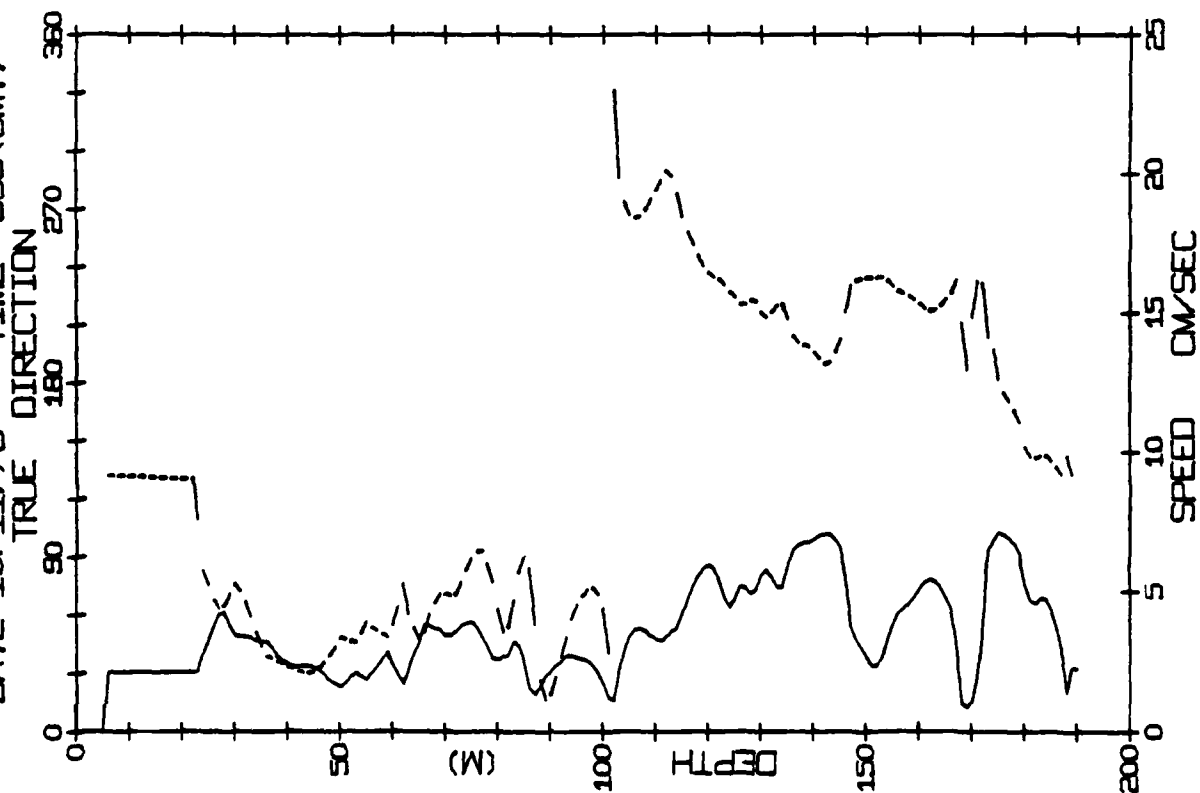
CAMP BLUE FOX STATION 378
DATE 7/11/75 TIME 544(GMT)

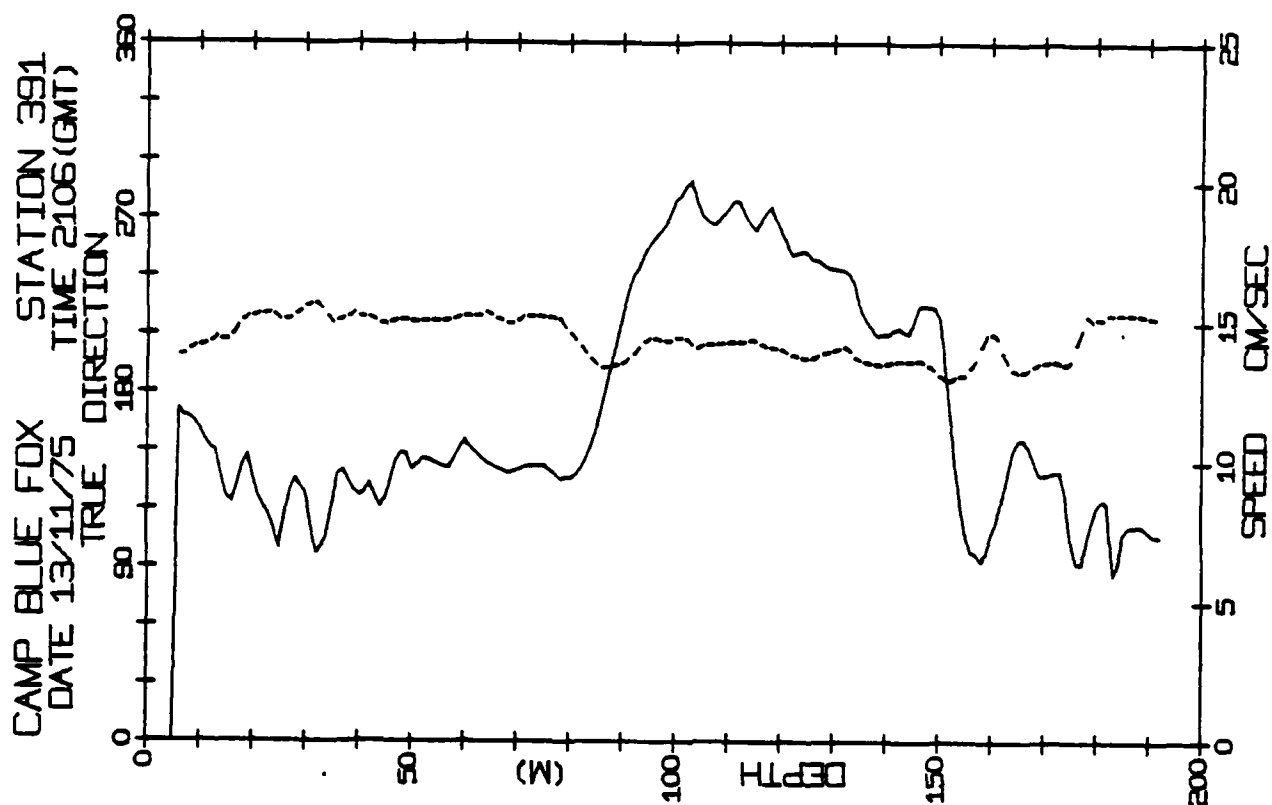
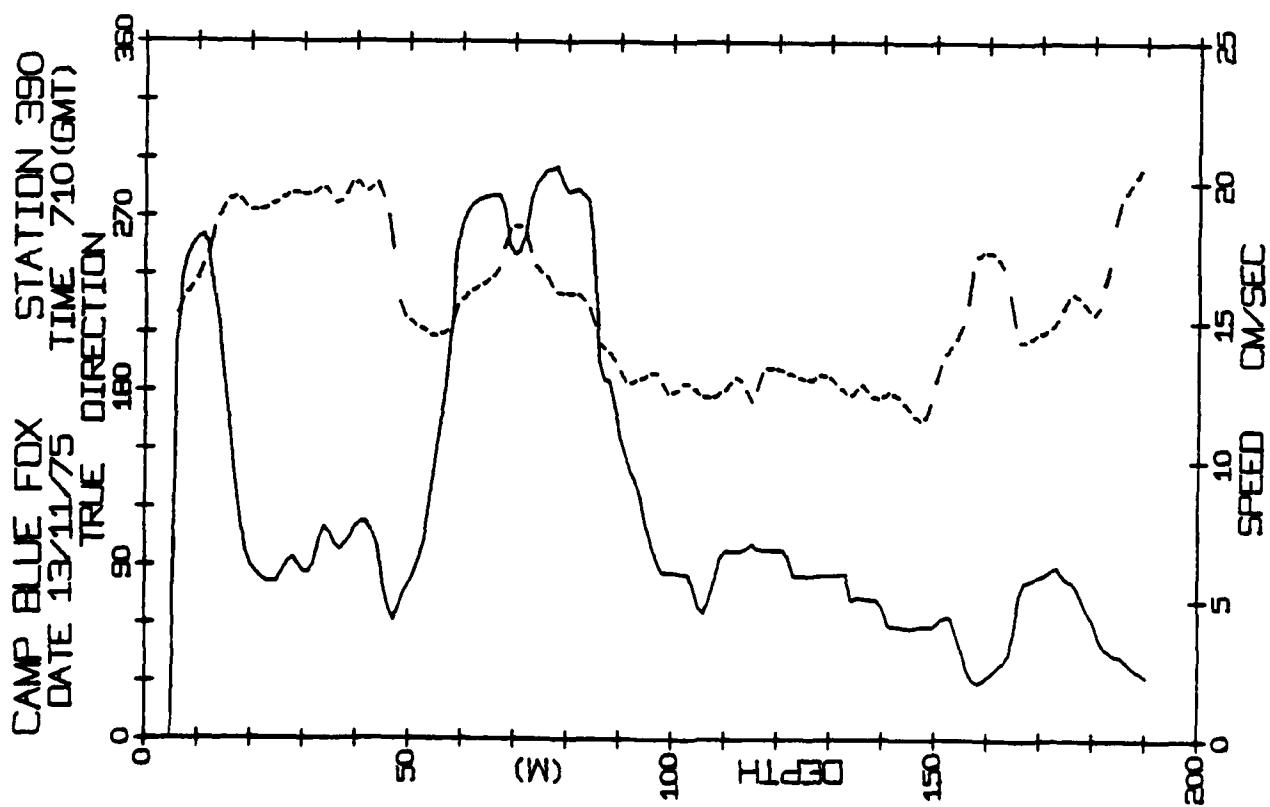


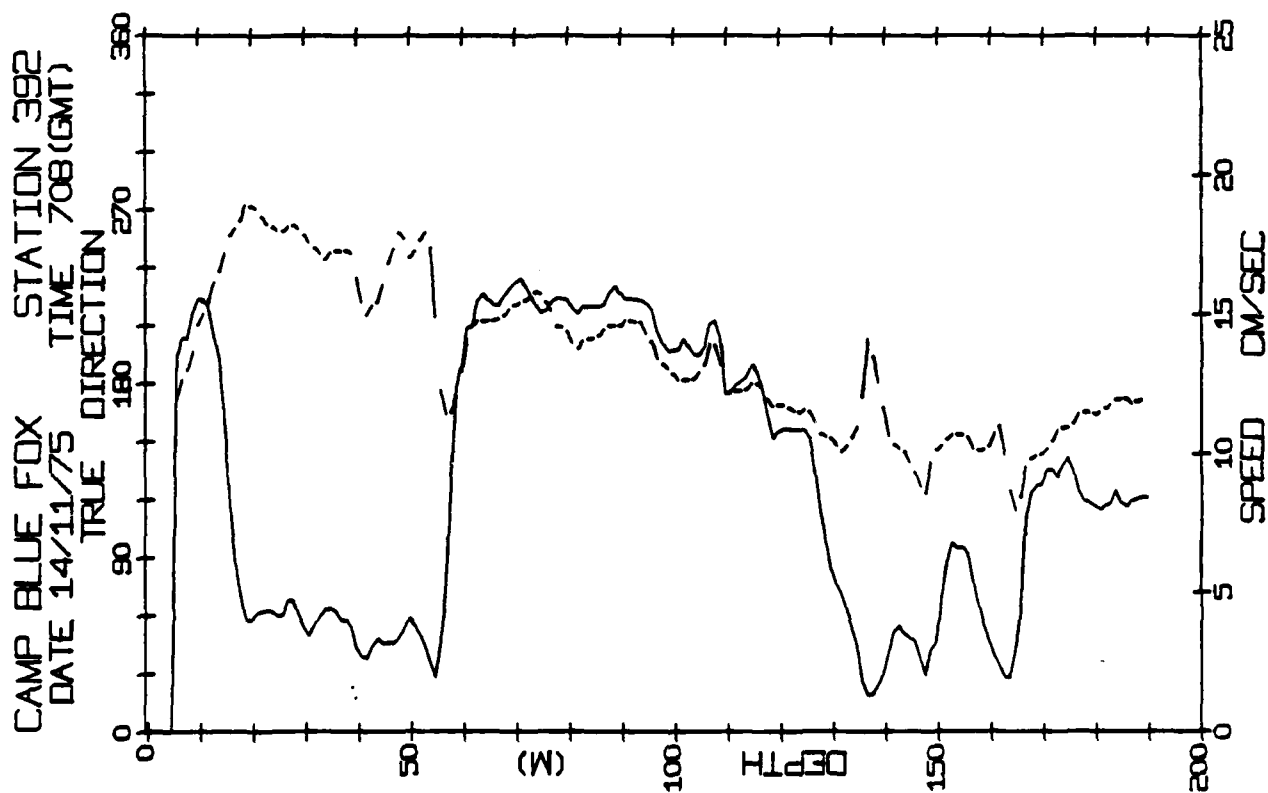
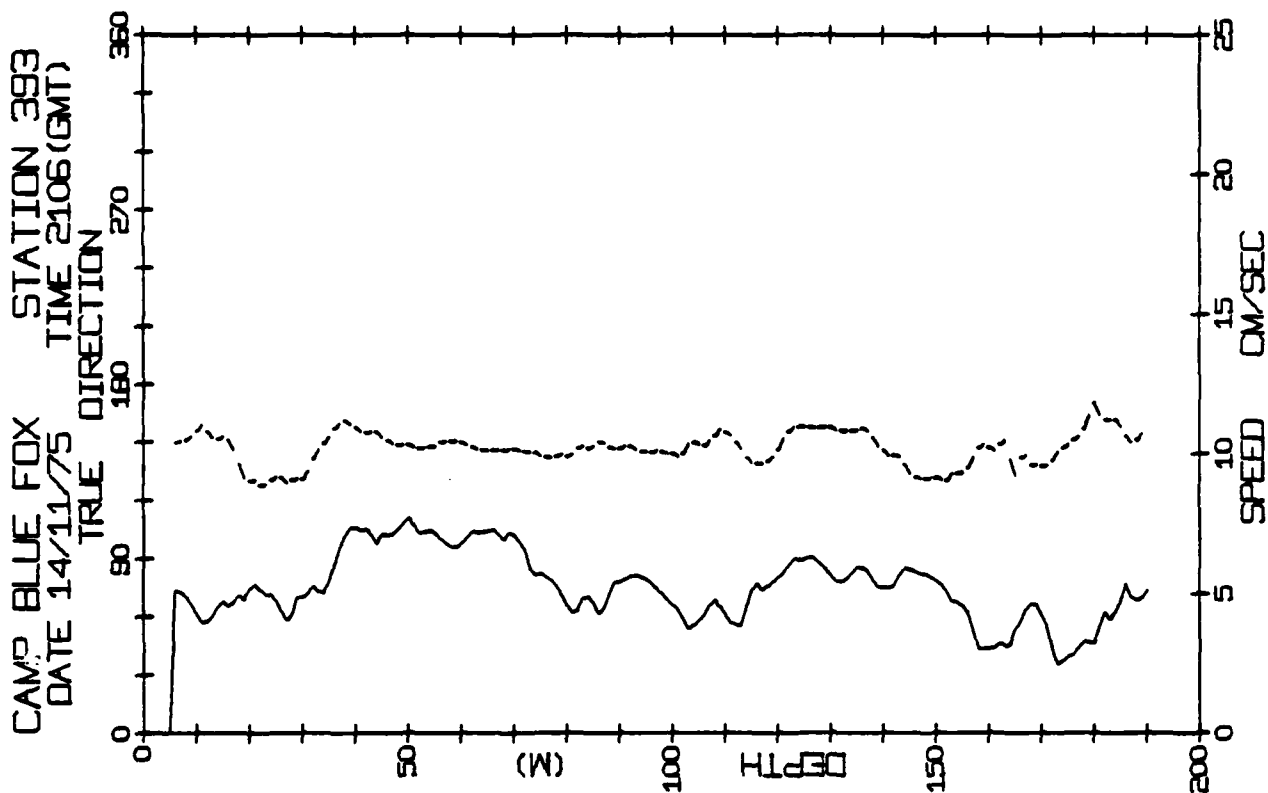
CAMP BLUE FOX STATION 389
 DATE 12/11/75 TIME 2048(GMT)

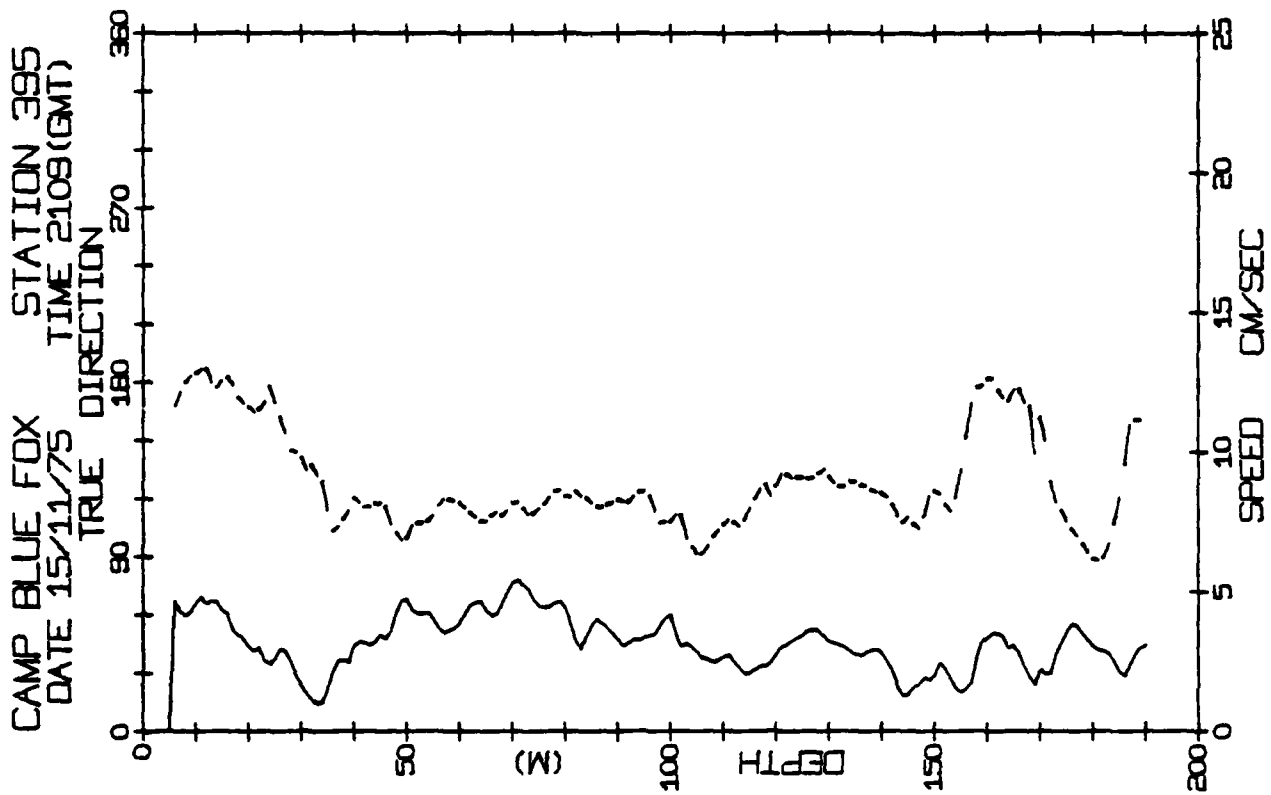
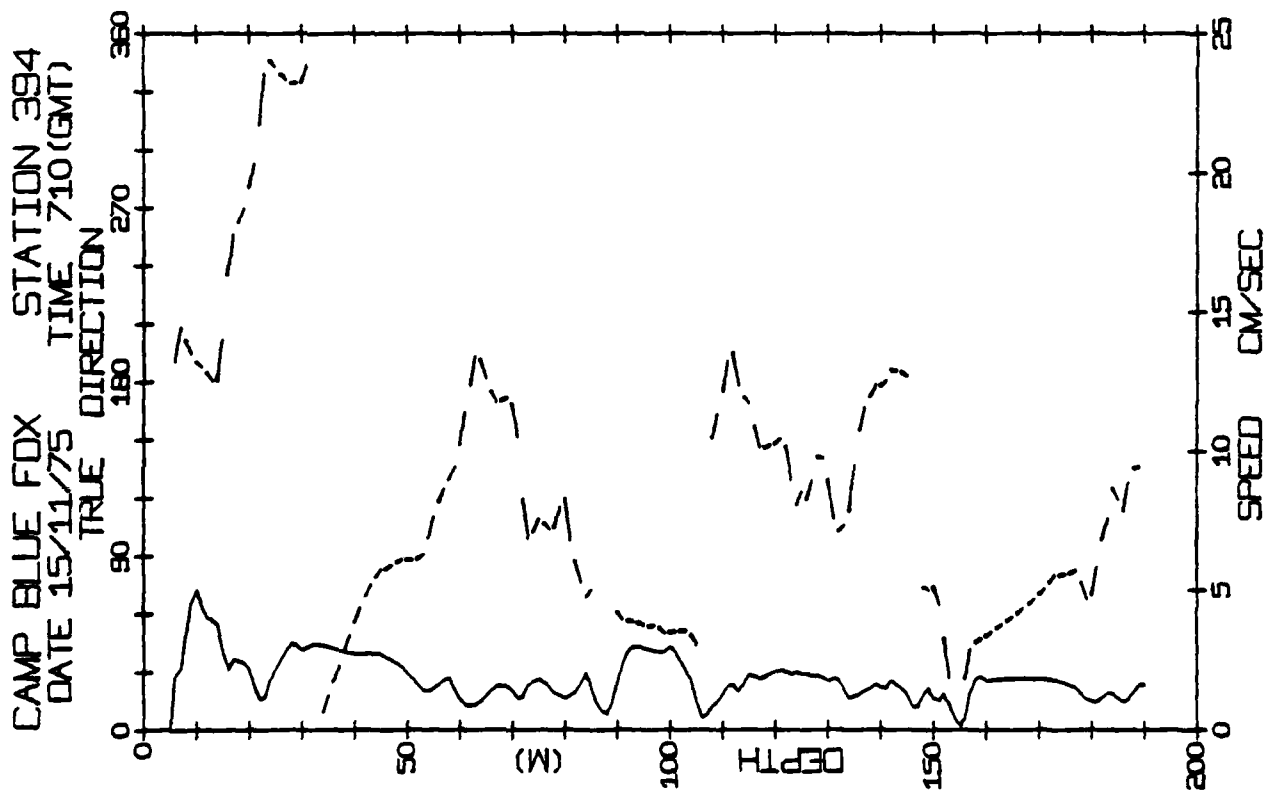


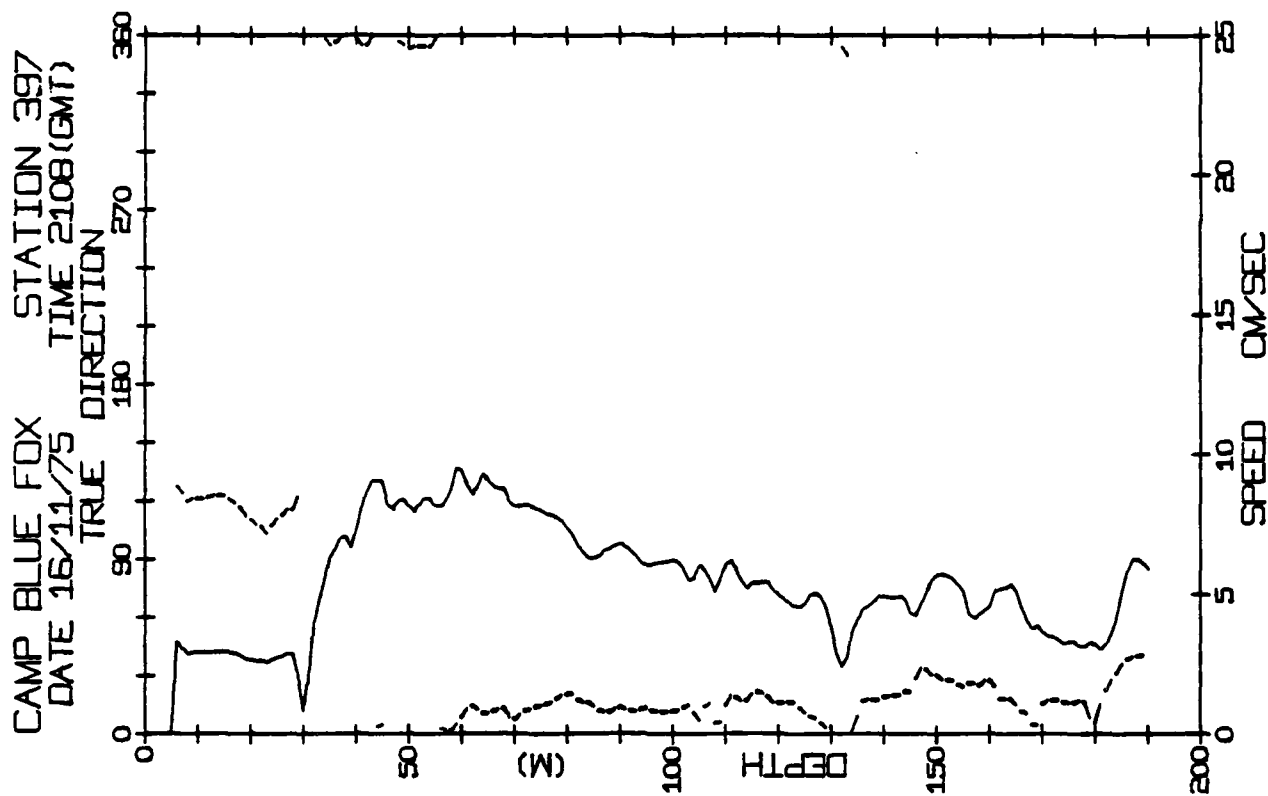
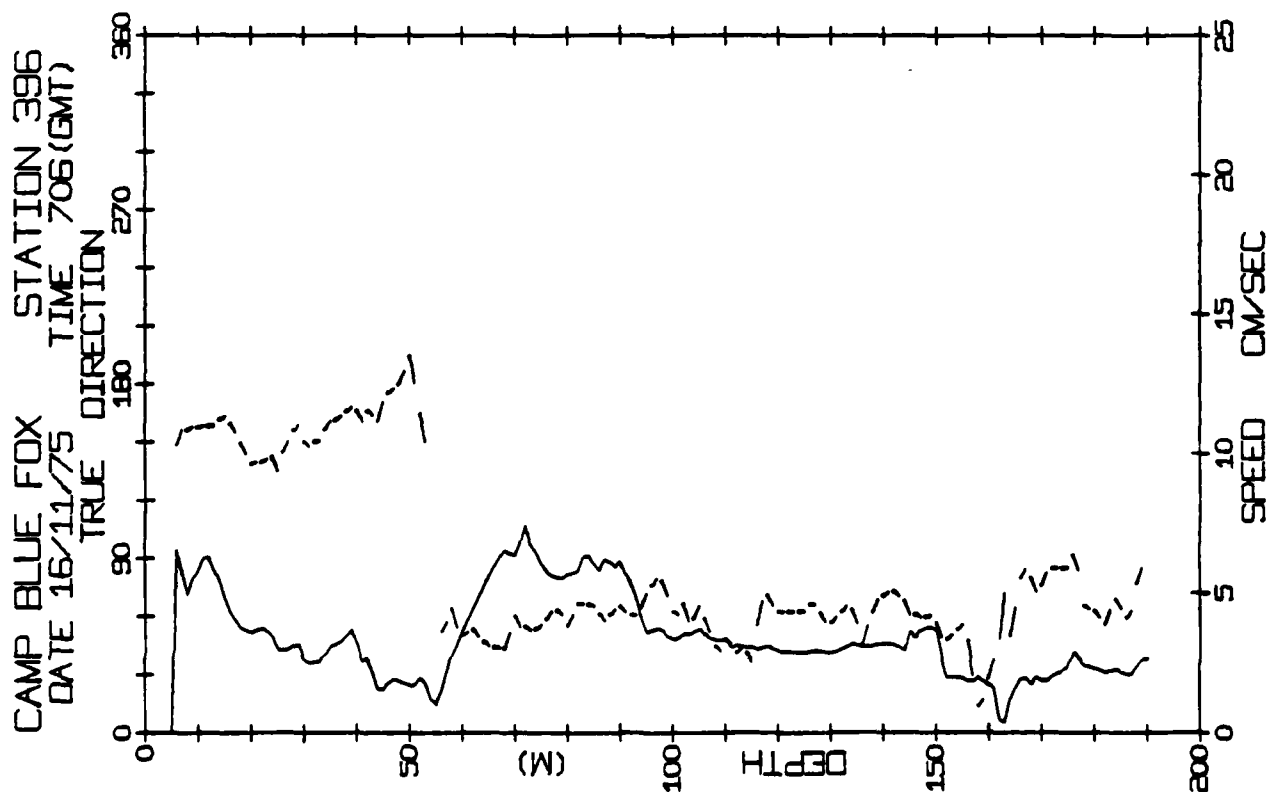
CAMP BLUE FOX STATION 384
 DATE 10/11/75 TIME 559(GMT)



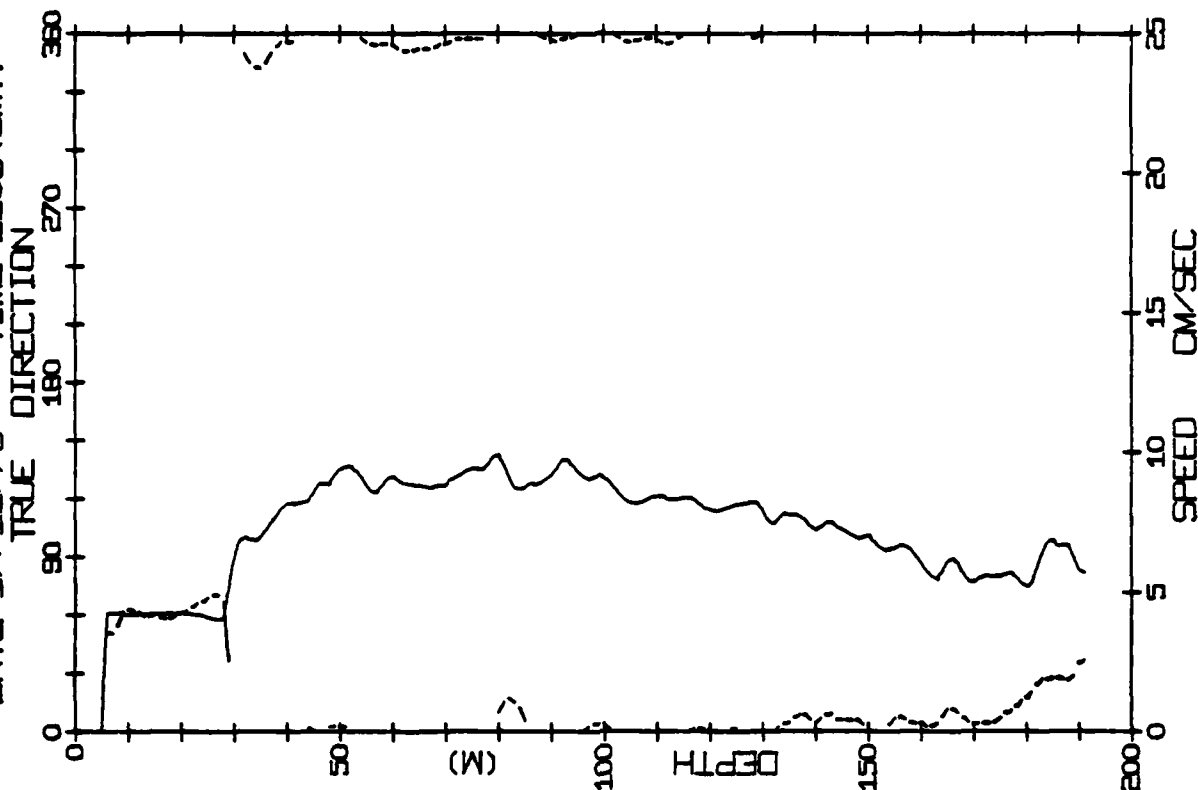




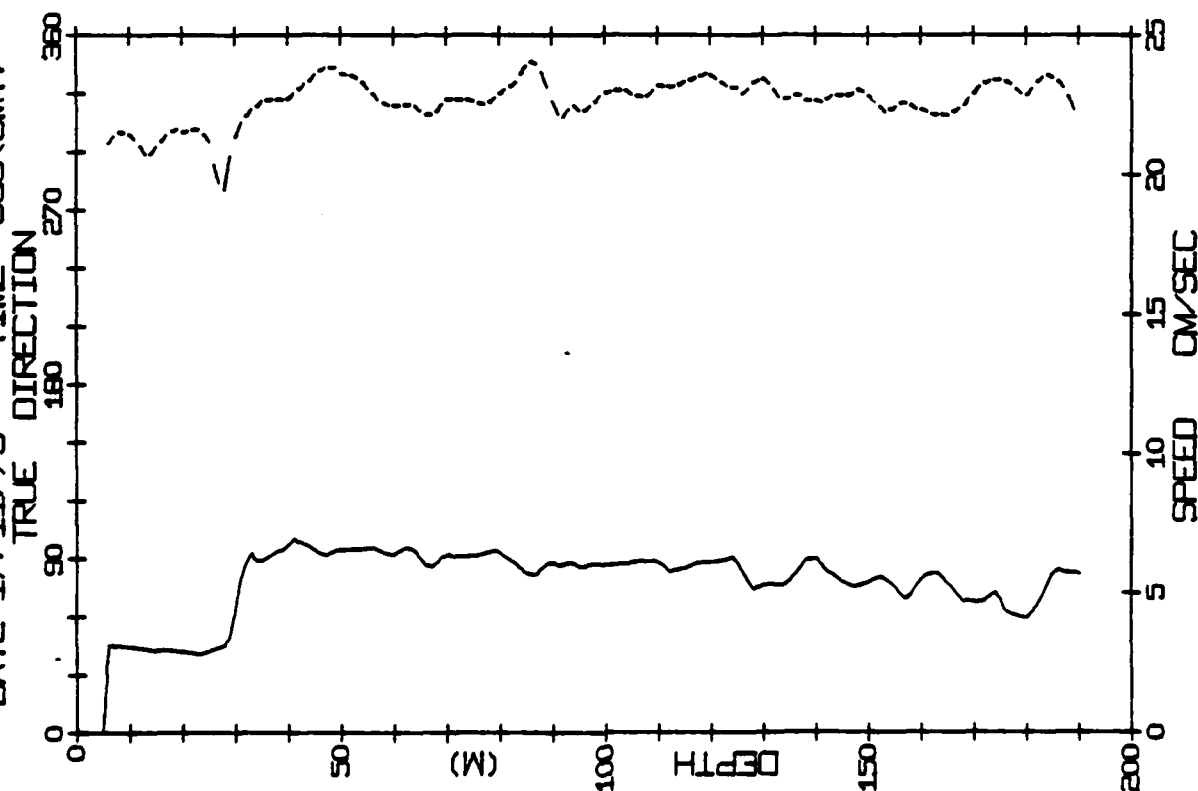




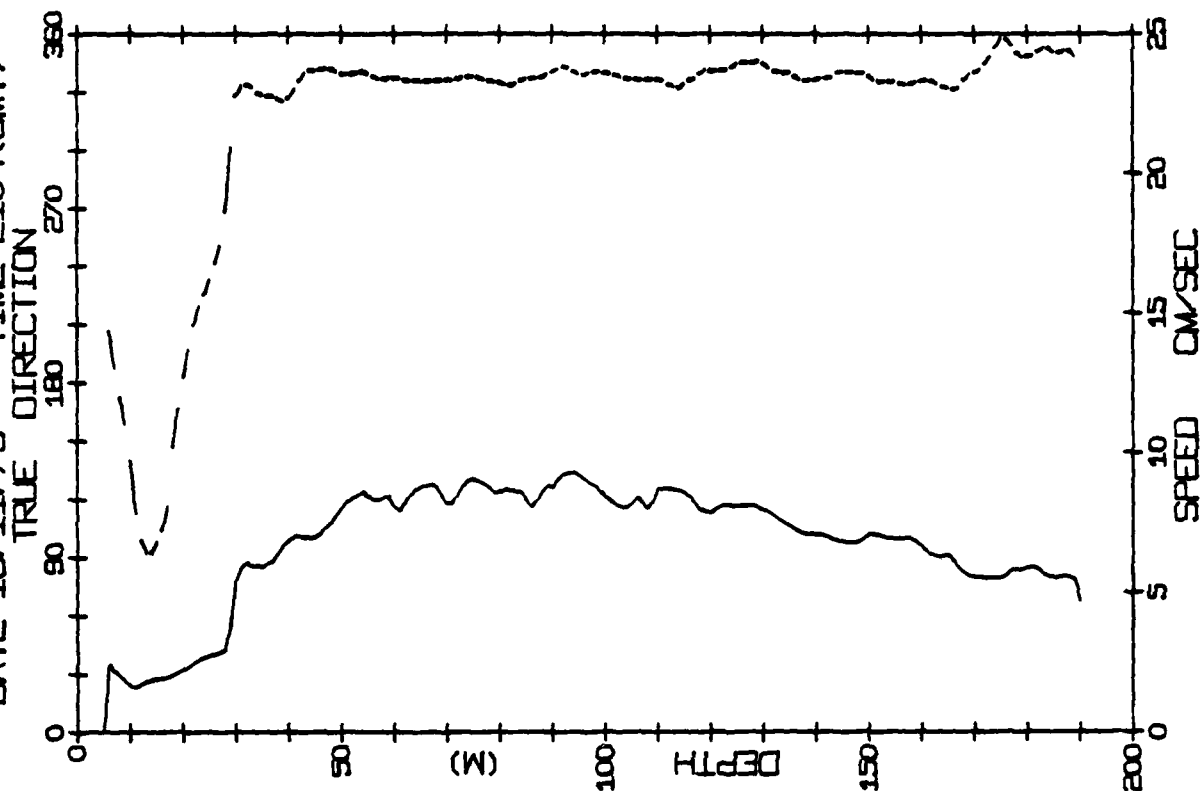
CAMP BLUE FOX STATION 399
DATE 17/11/75 TIME 2109 (GMT)



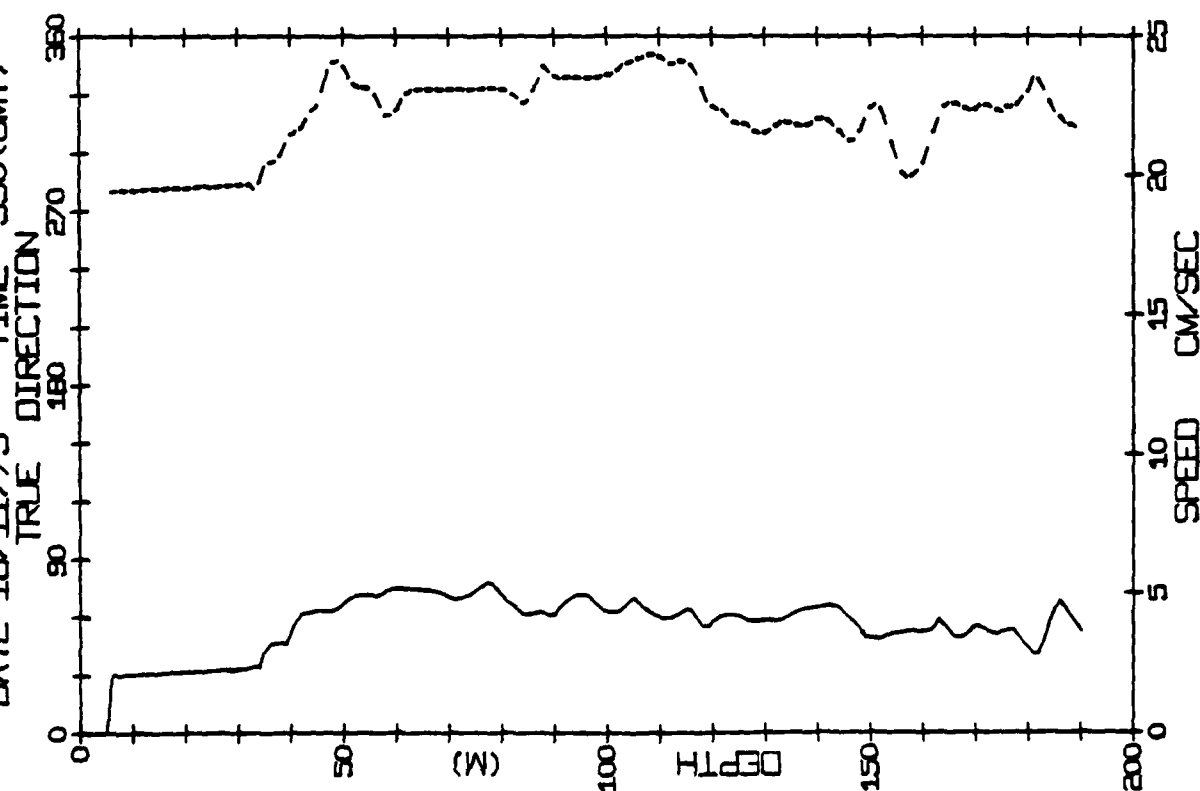
CAMP BLUE FOX STATION 398
DATE 17/11/75 TIME 533 (GMT)



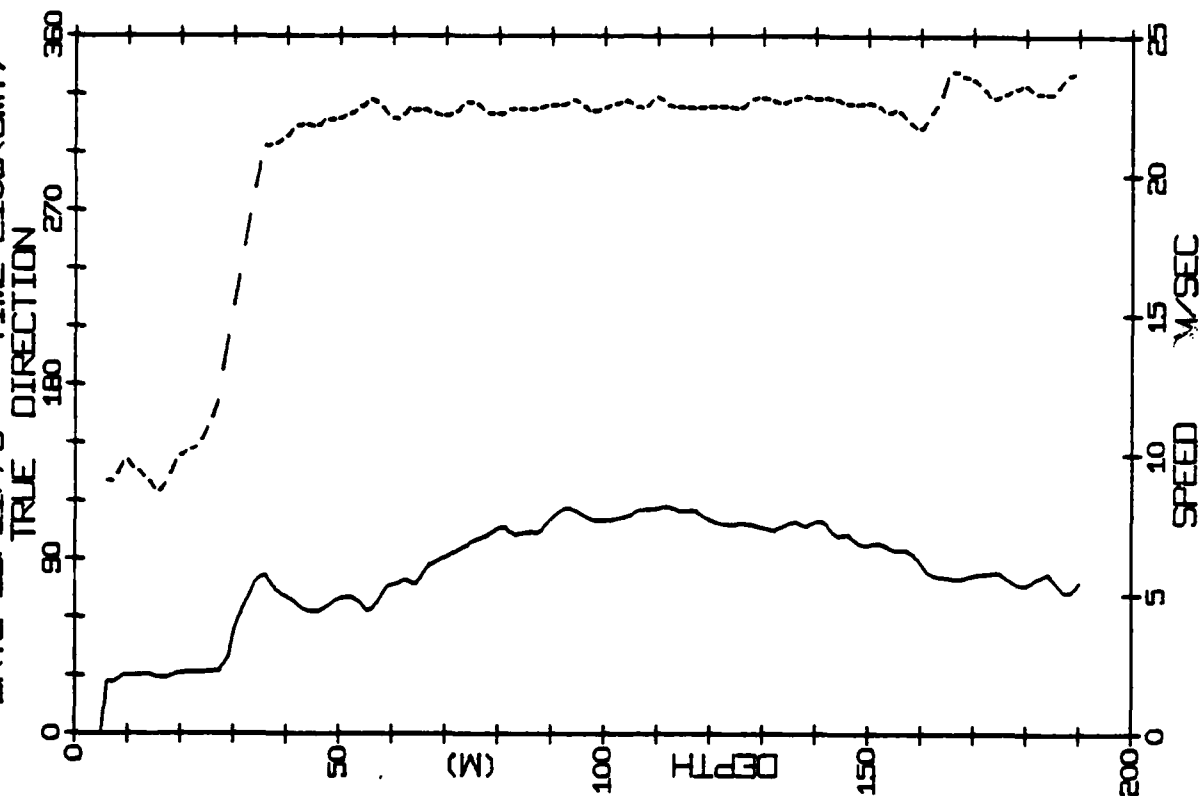
CAMP BLUE FOX STATION 401
DATE 18/11/75 TIME 2104(GMT)



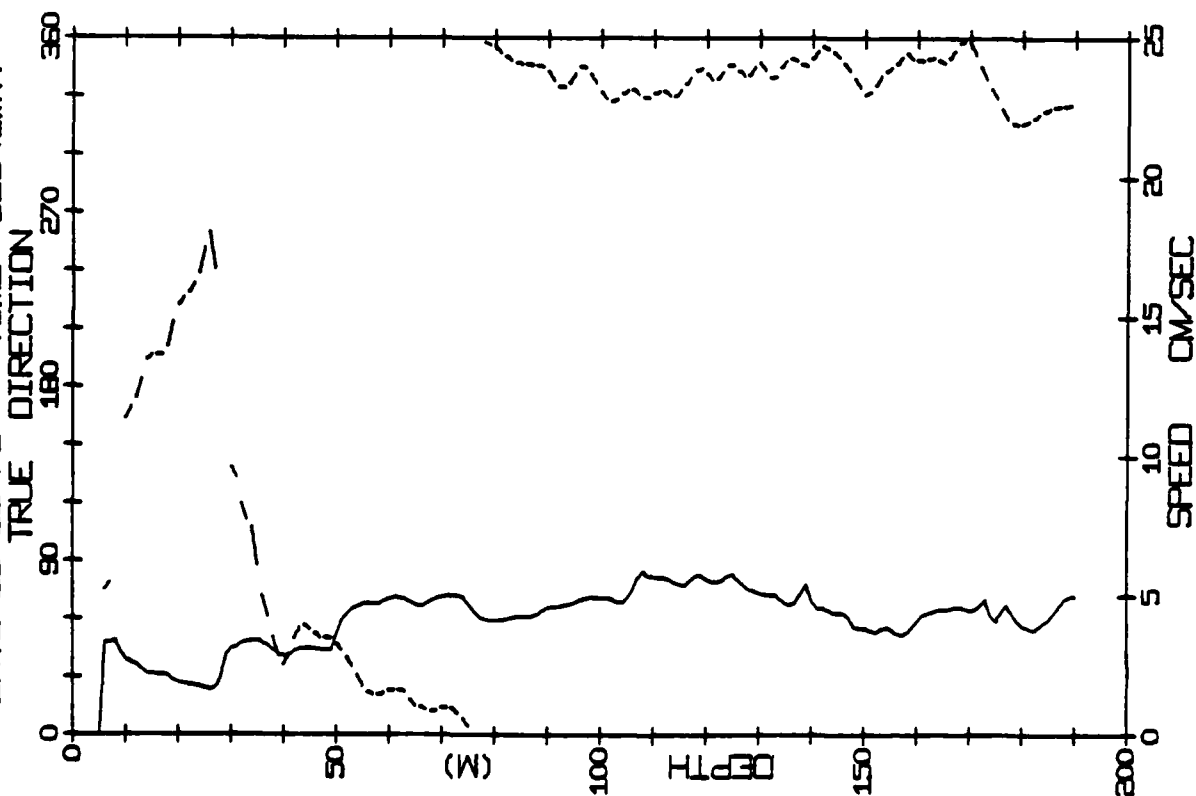
CAMP BLUE FOX STATION 400
DATE 18/11/75 TIME 550(GMT)



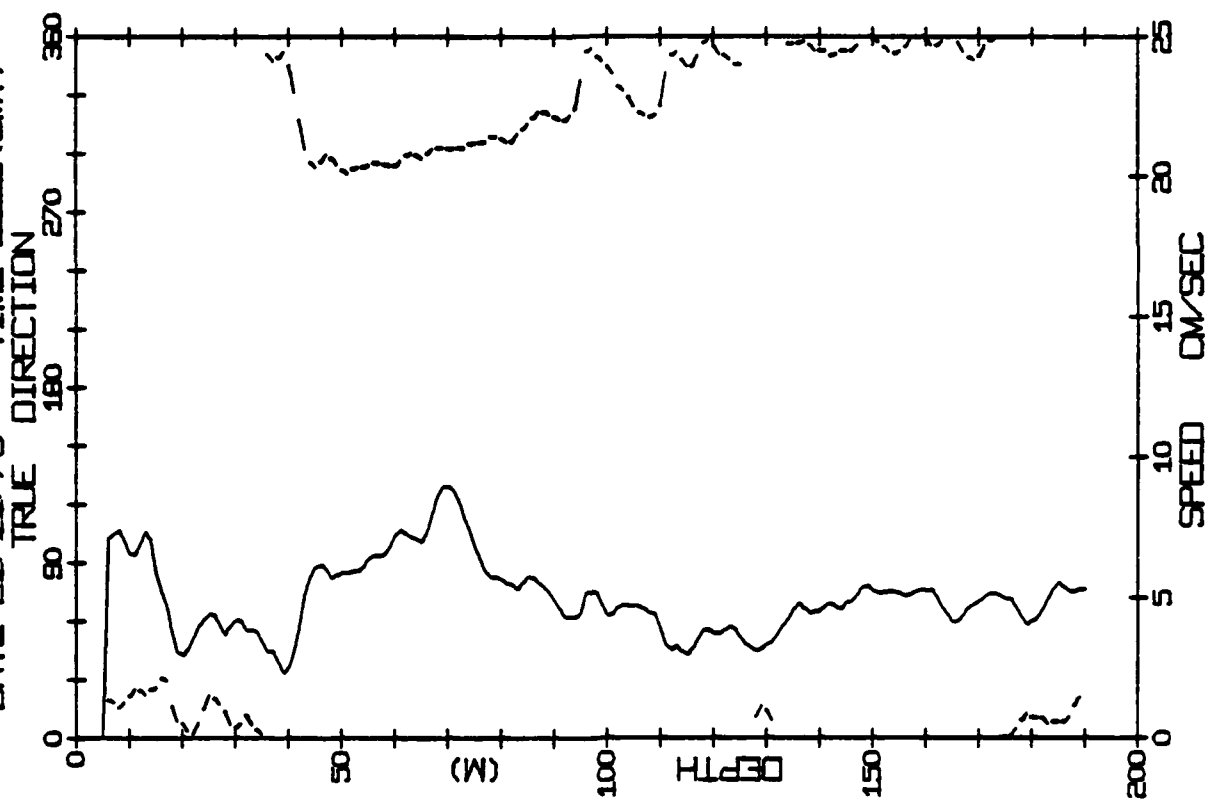
CAMP BLUE FOX STATION 403
DATE 19/11/75 TIME 2108(GMT)



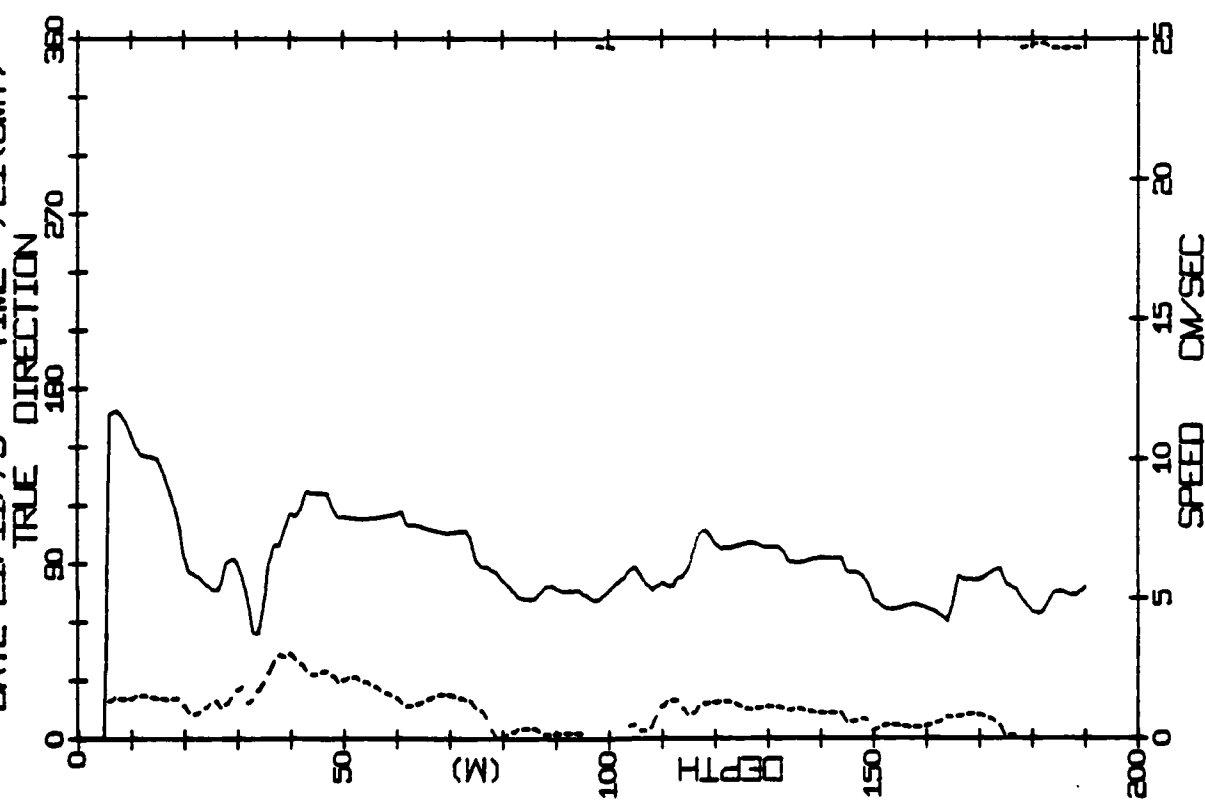
CAMP BLUE FOX STATION 402
DATE 19/11/75 TIME 525(GMT)

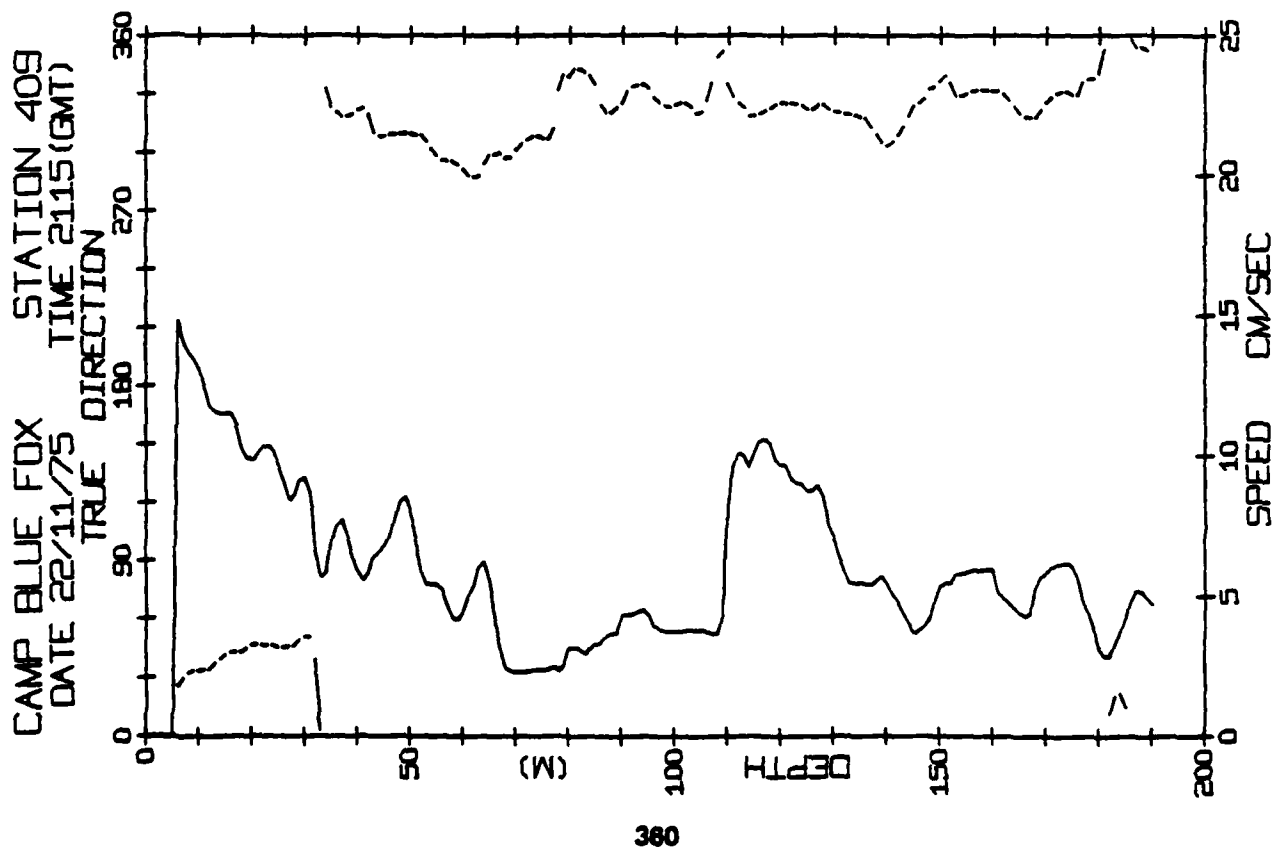
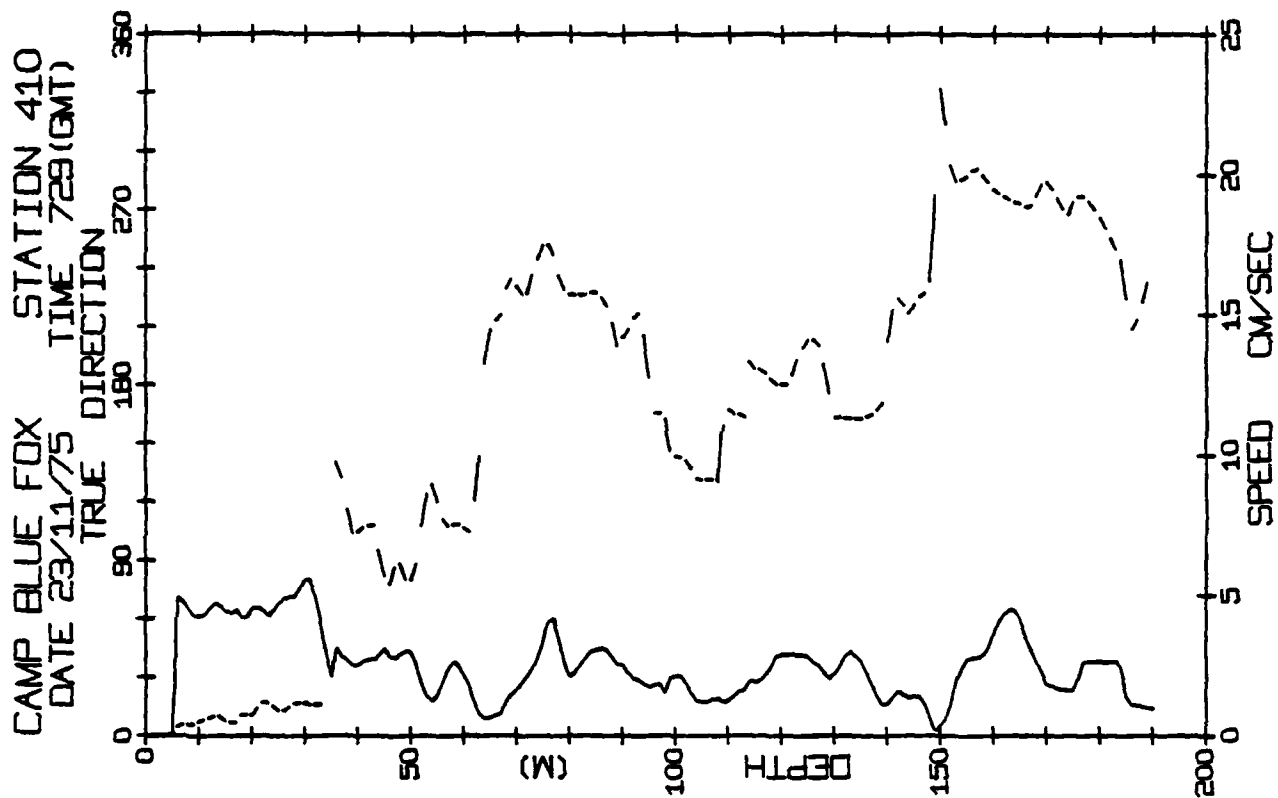


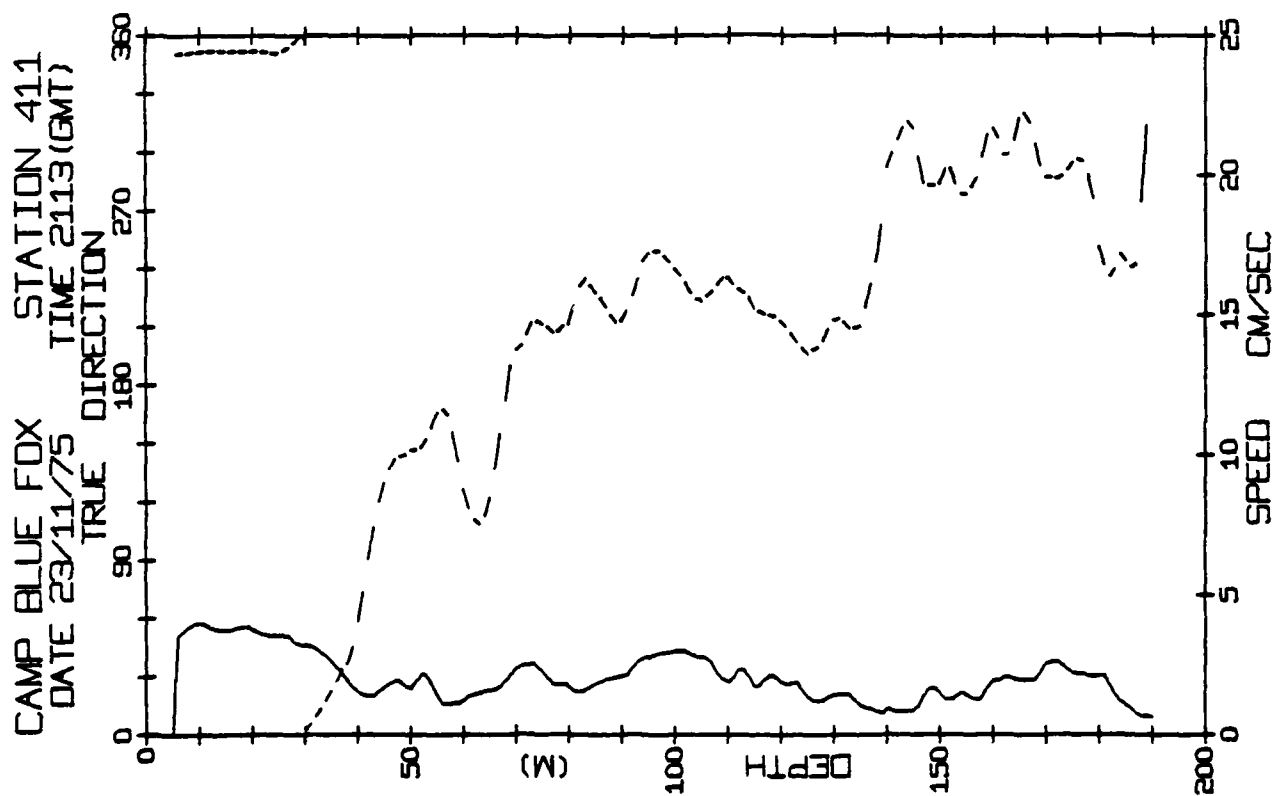
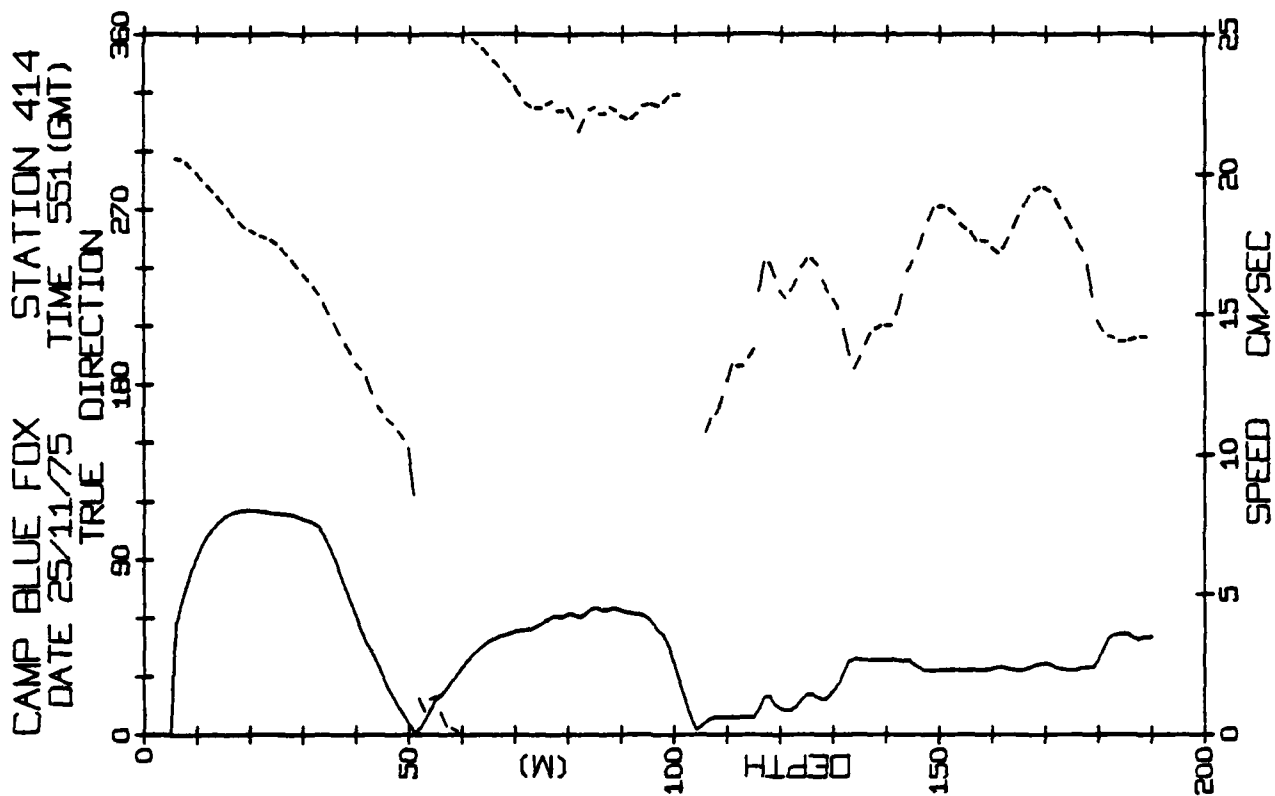
CAMP BLUE FOX STATION 407
 DATE 21/11/75 TIME 2122 (GMT)



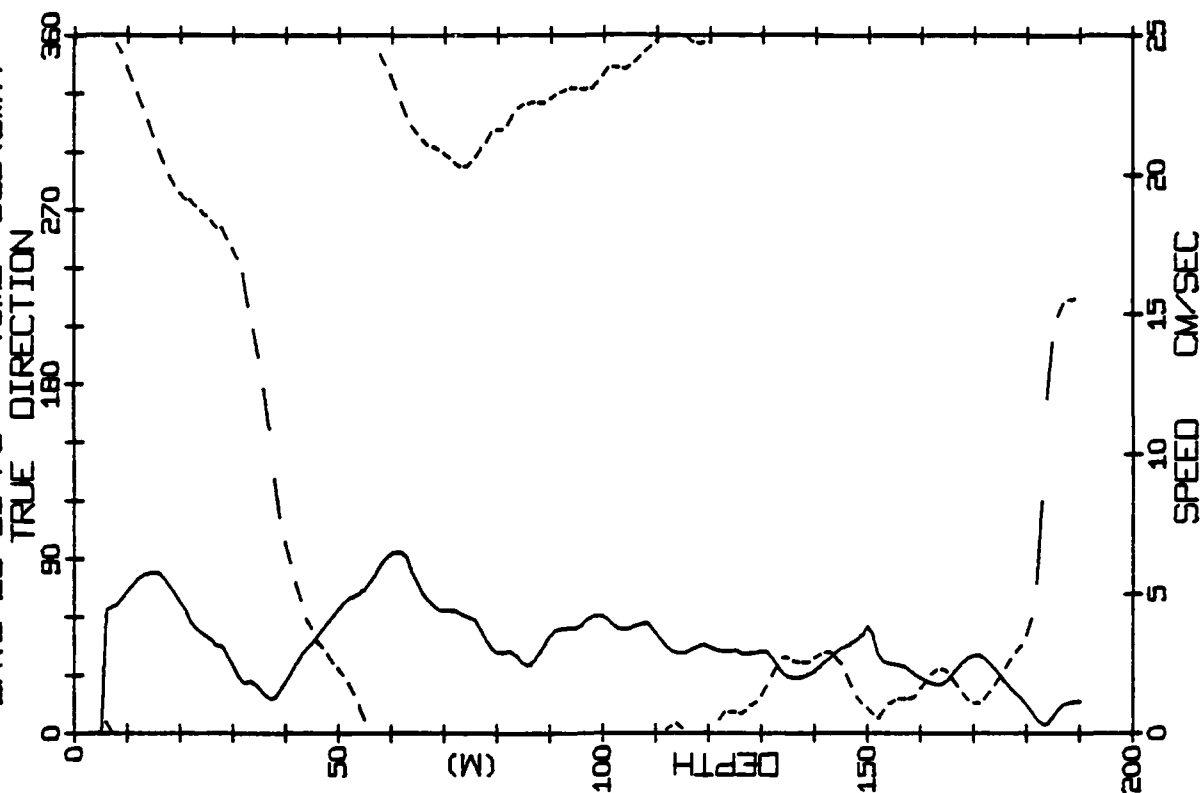
CAMP BLUE FOX STATION 406
 DATE 21/11/75 TIME 721 (GMT)



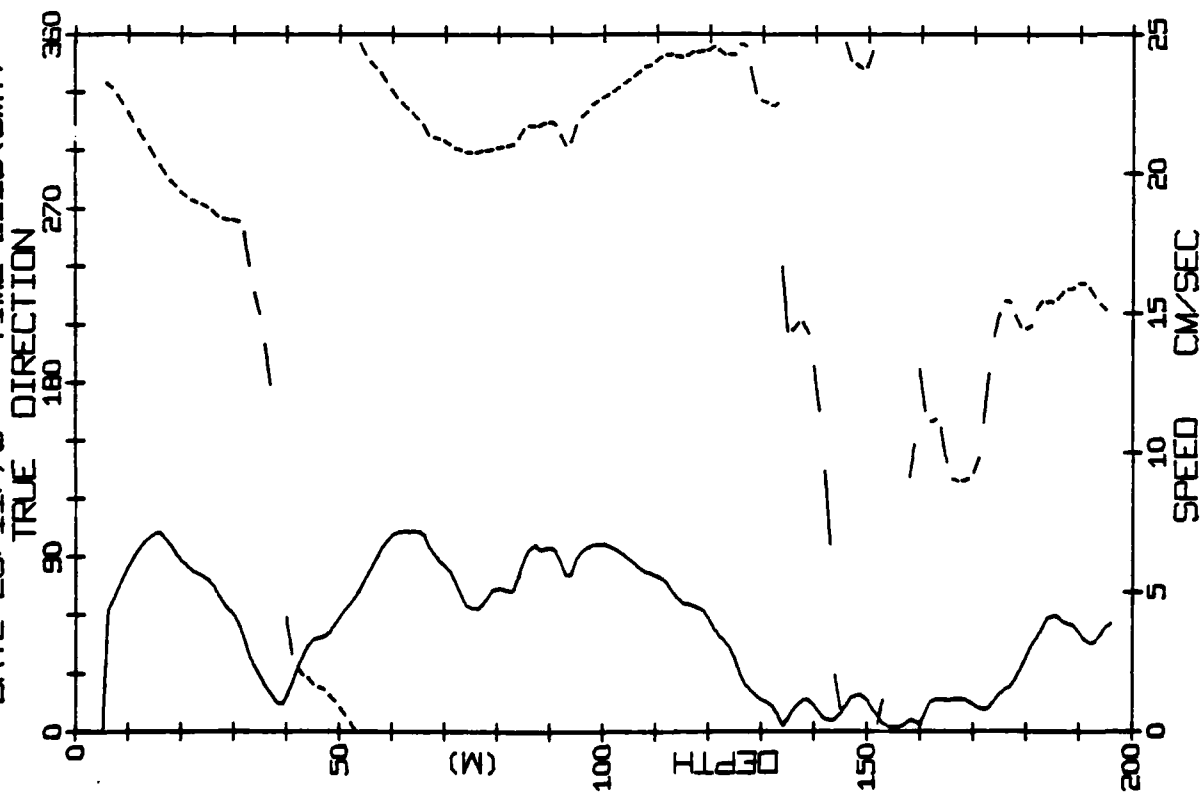




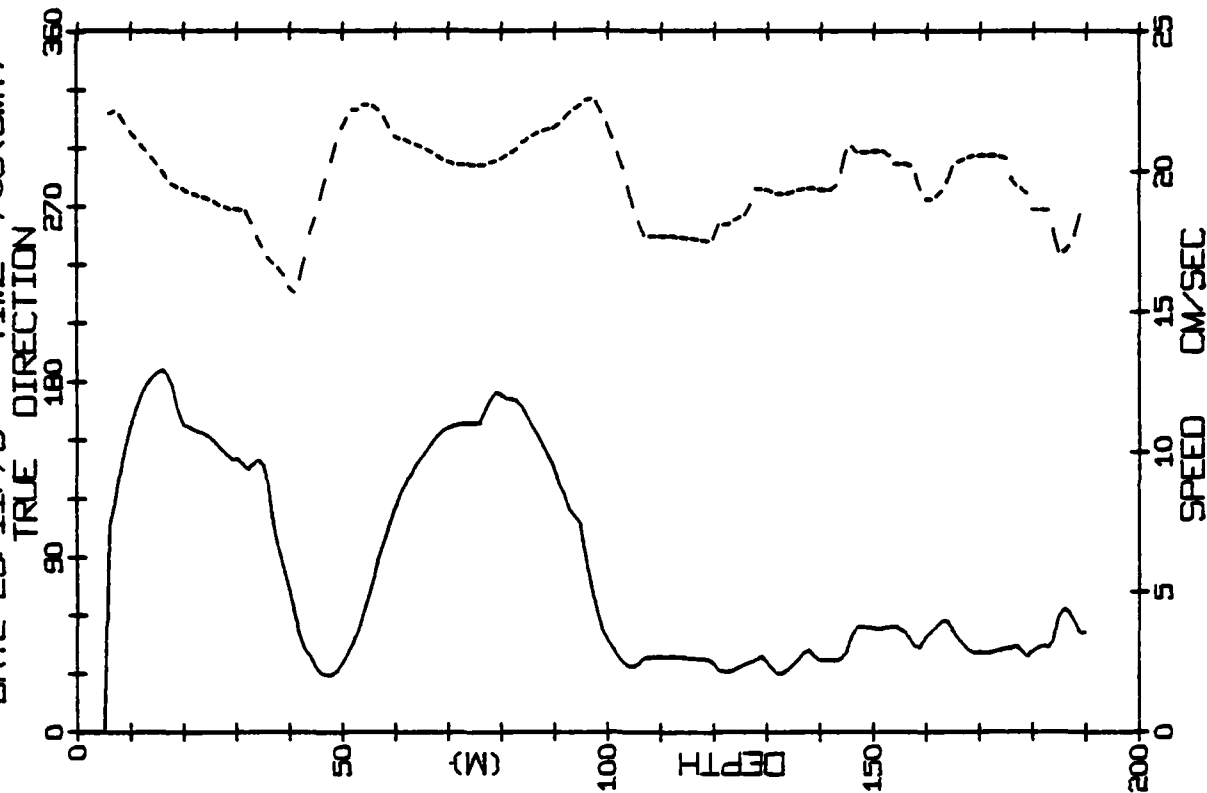
CAMP BLUE FOX STATION 416
DATE 26/11/75 TIME 535 (GMT)



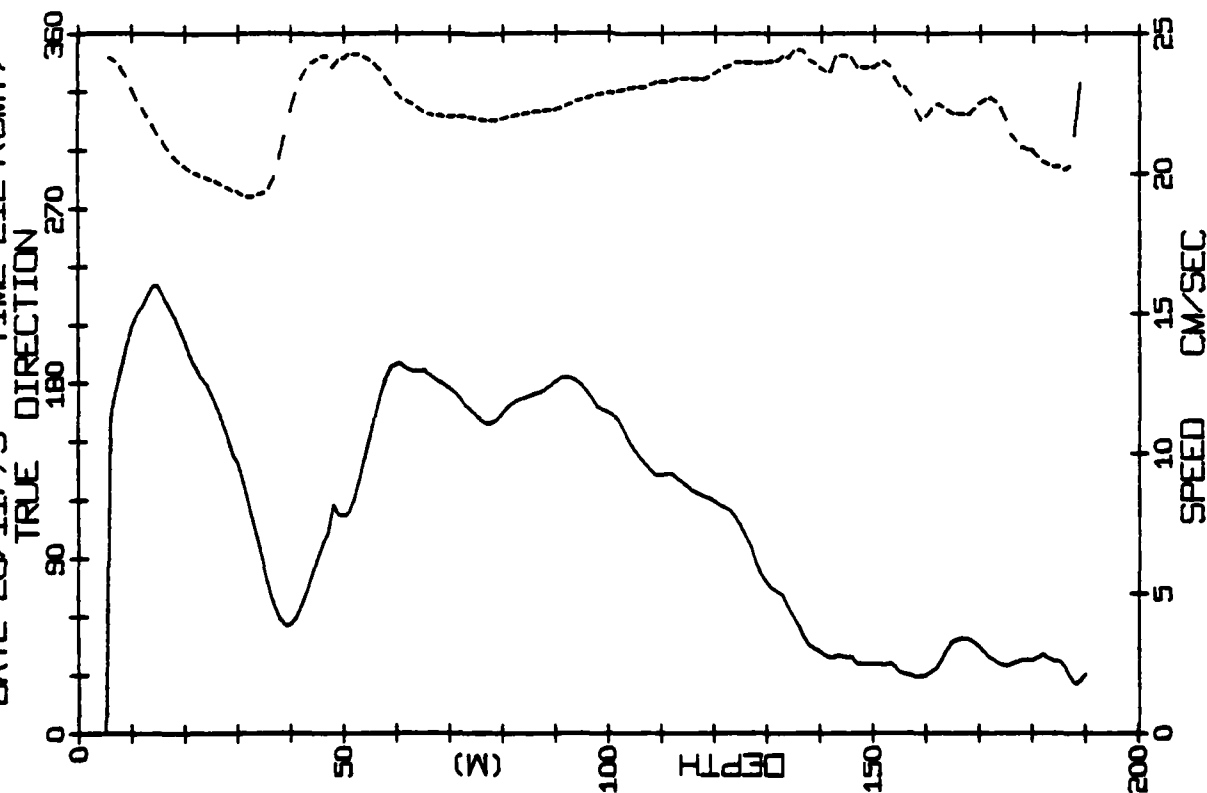
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DATE 25/11/75 TIME 2119 (GMT)



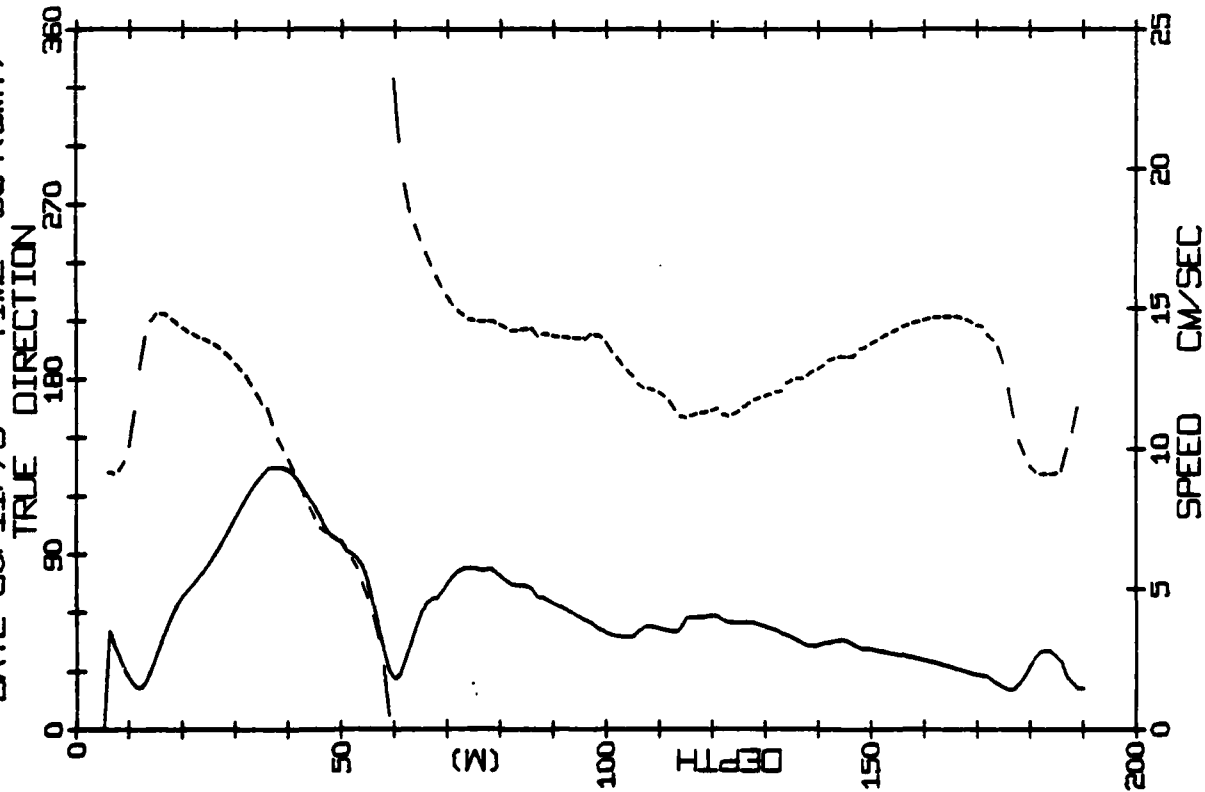
CAMP BLUE FOX STATION 422
 DATE 29/11/75 TIME 705 (GMT)



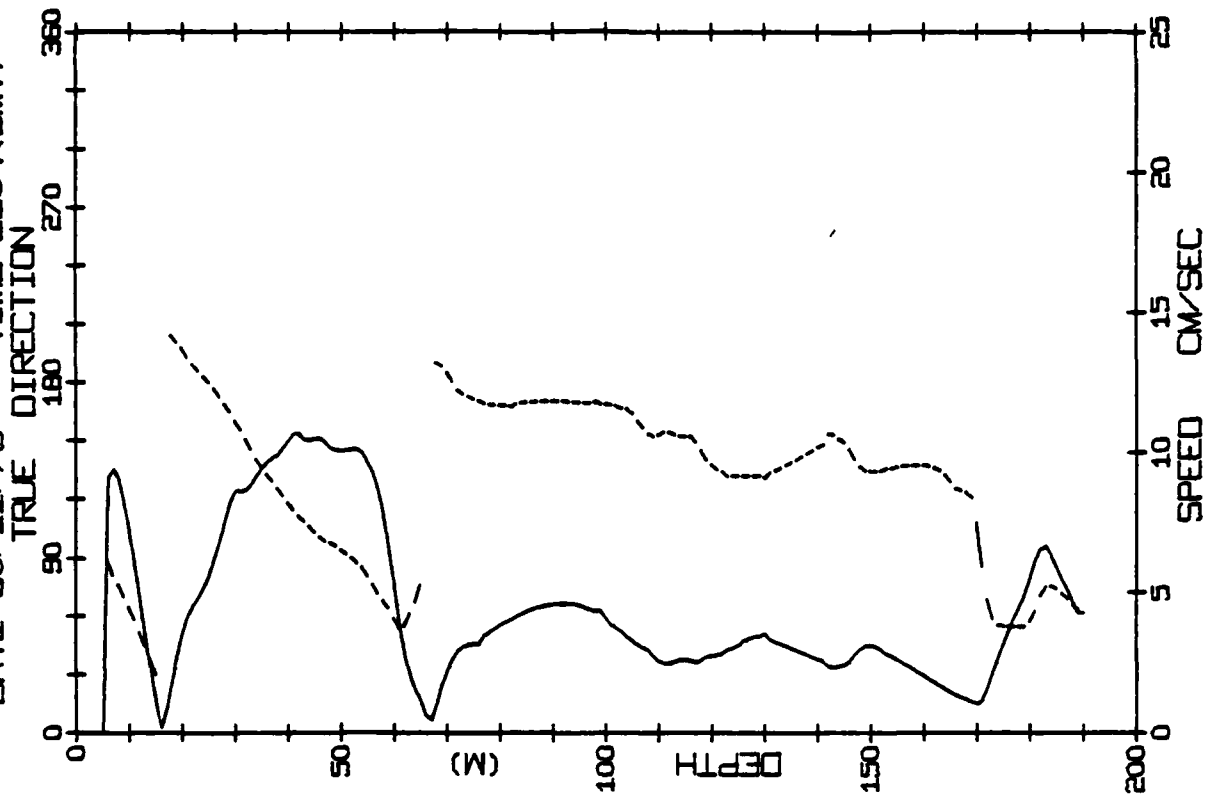
CAMP BLUE FOX STATION 421
 DATE 28/11/75 TIME 2124 (GMT)



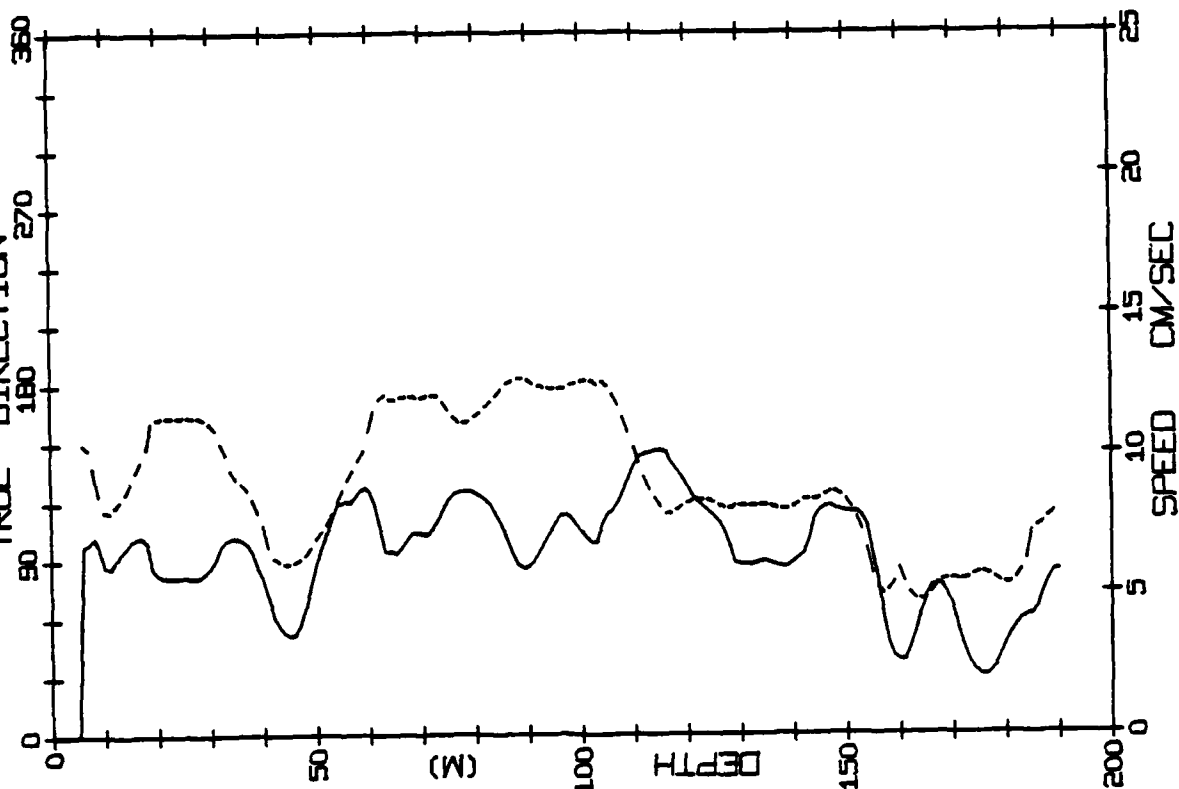
CAMP BLUE FOX STATION 424
DATE 30/11/75 TIME 534(GMT)



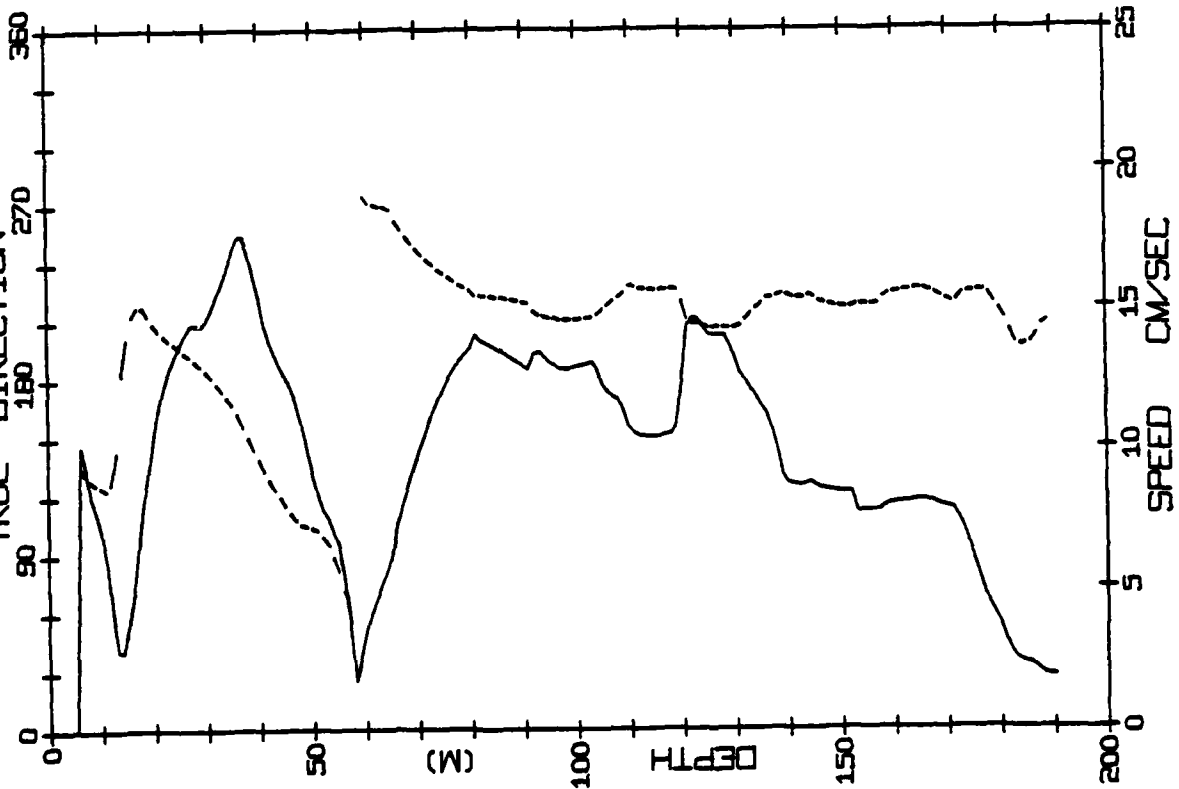
CAMP BLUE FOX STATION 425
DATE 30/11/75 TIME 2104(GMT)



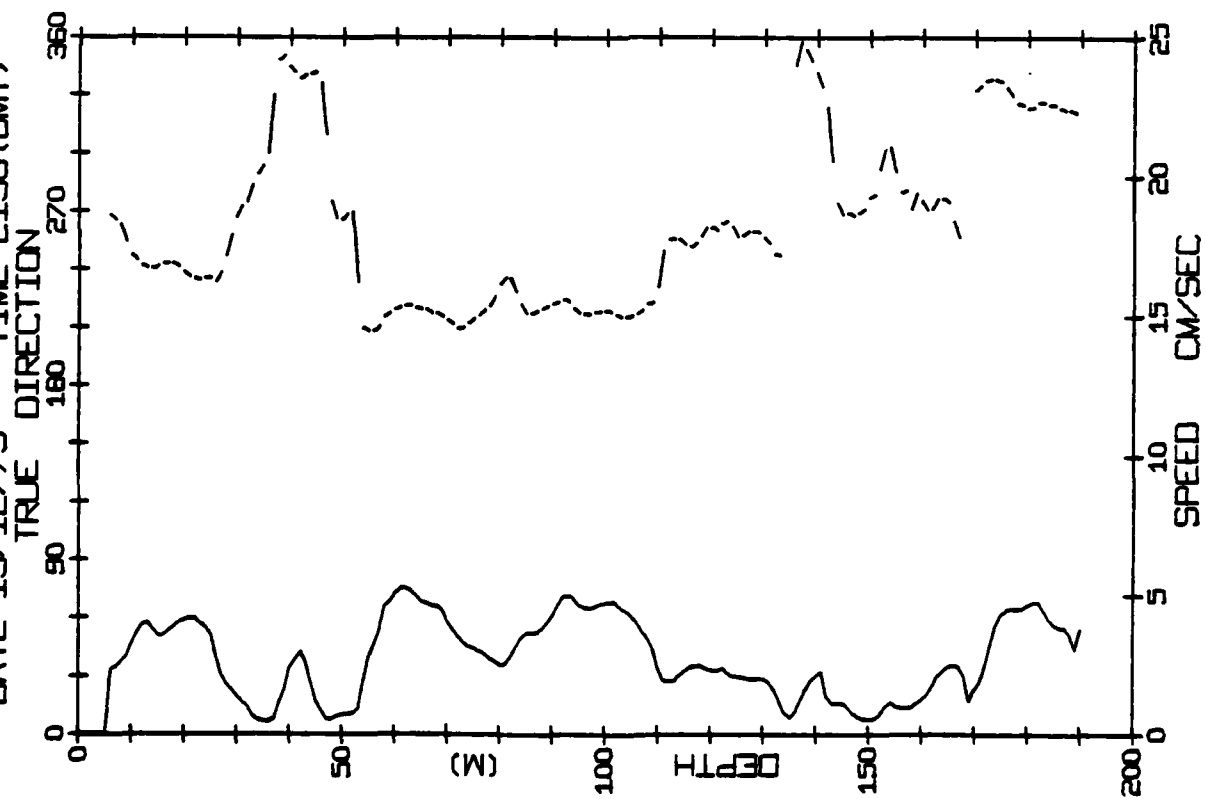
CAMP BLUE FOX STATION 437
 DATE 11/12/75 TIME 519(GMT)
 TRUE DIRECTION



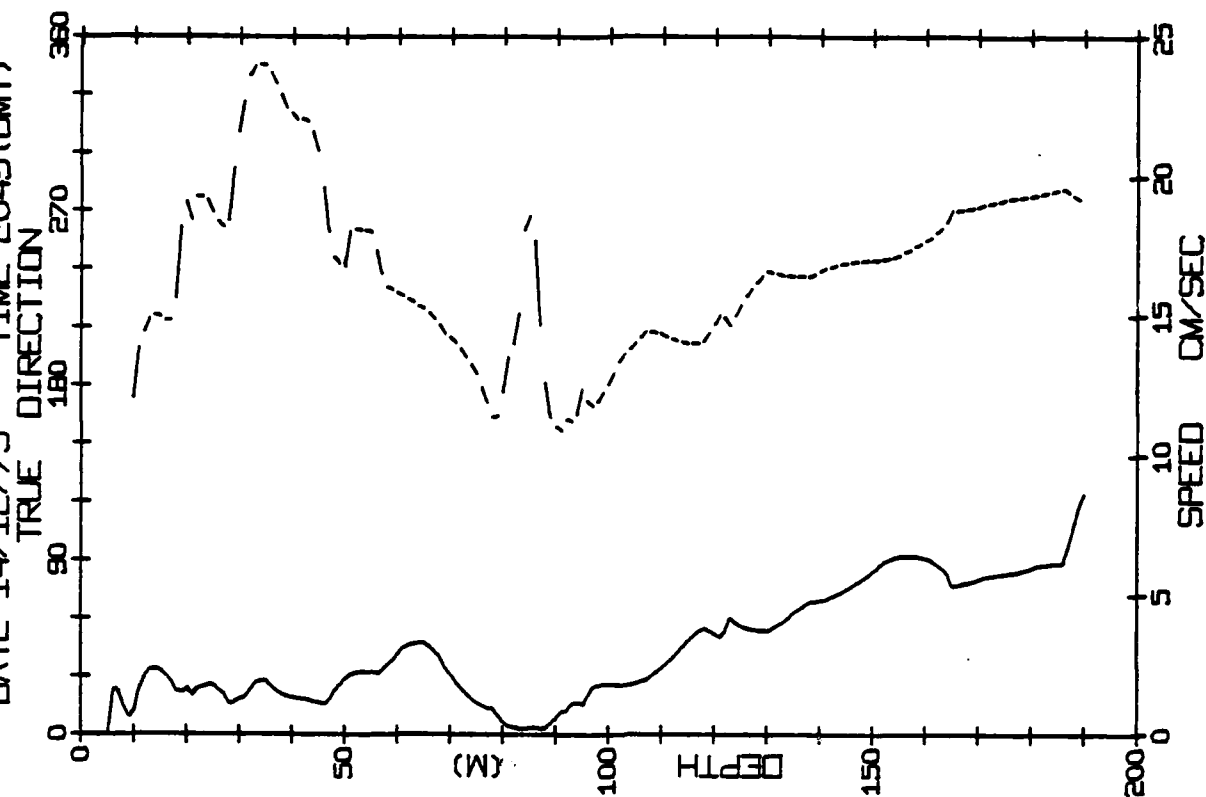
CAMP BLUE FOX STATION 426
 DATE 1/12/75 TIME 531(GMT)
 TRUE DIRECTION



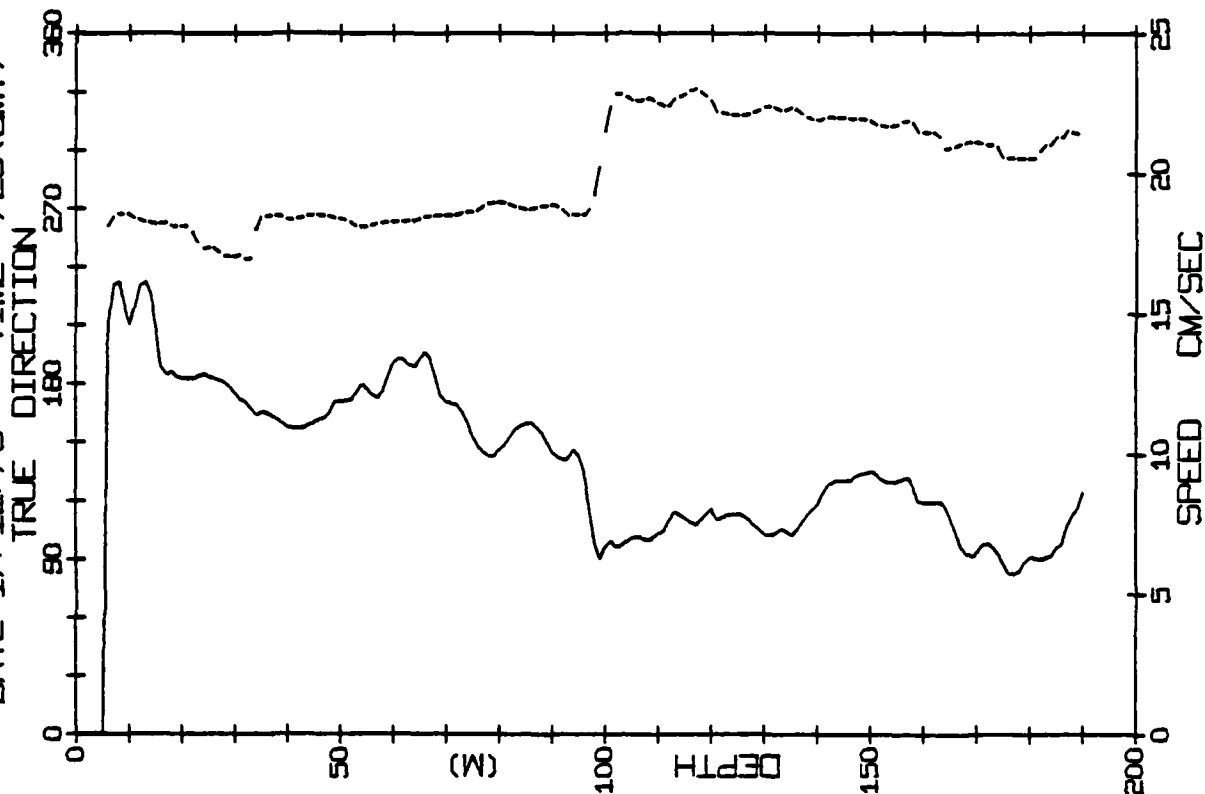
CAMP BLUE FOX STATION 442
DATE 13/12/75 TIME 2136(GMT)



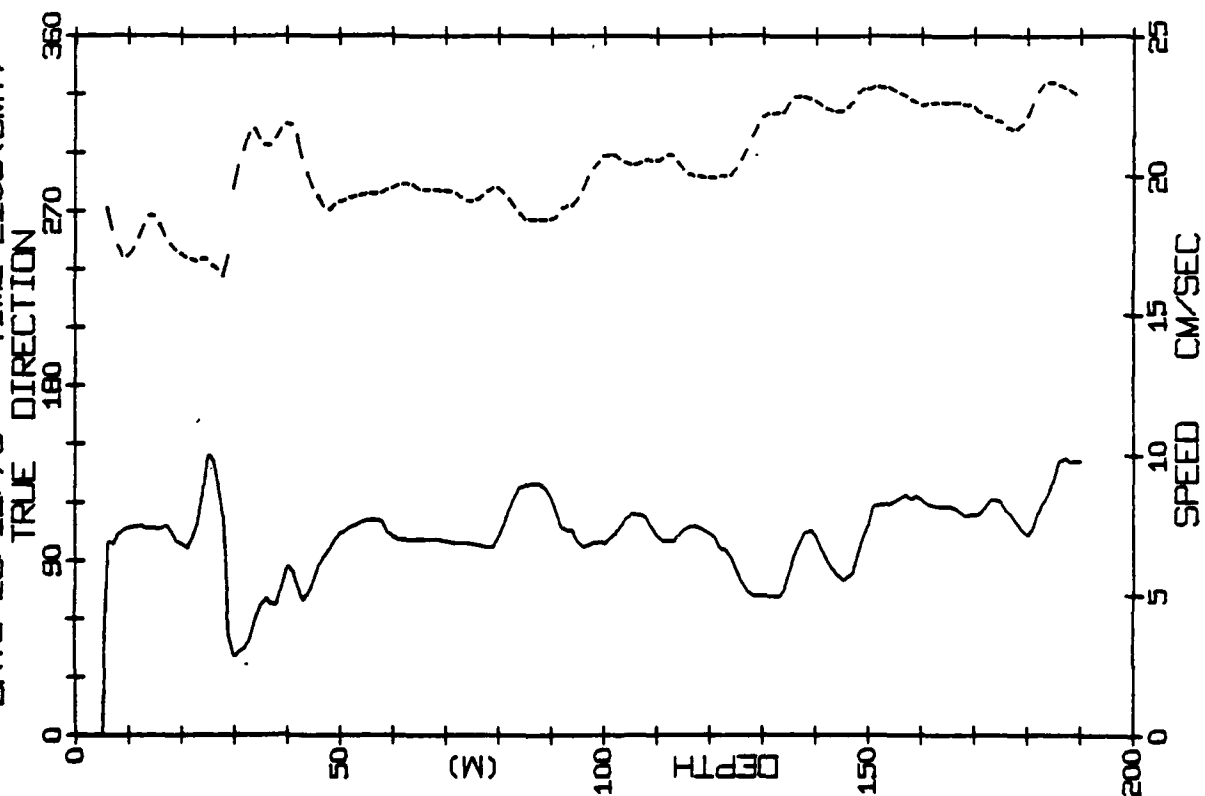
CAMP BLUE FOX STATION 444
DATE 14/12/75 TIME 2049(GMT)

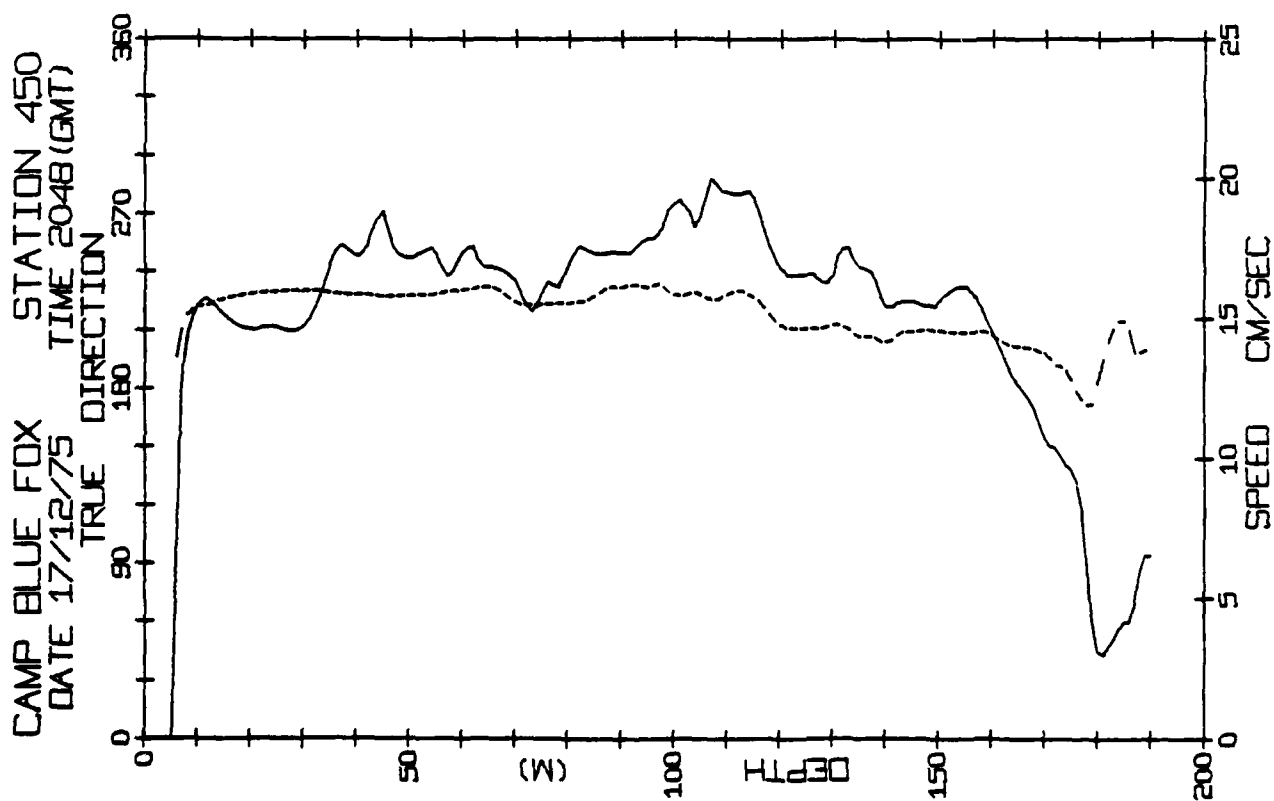
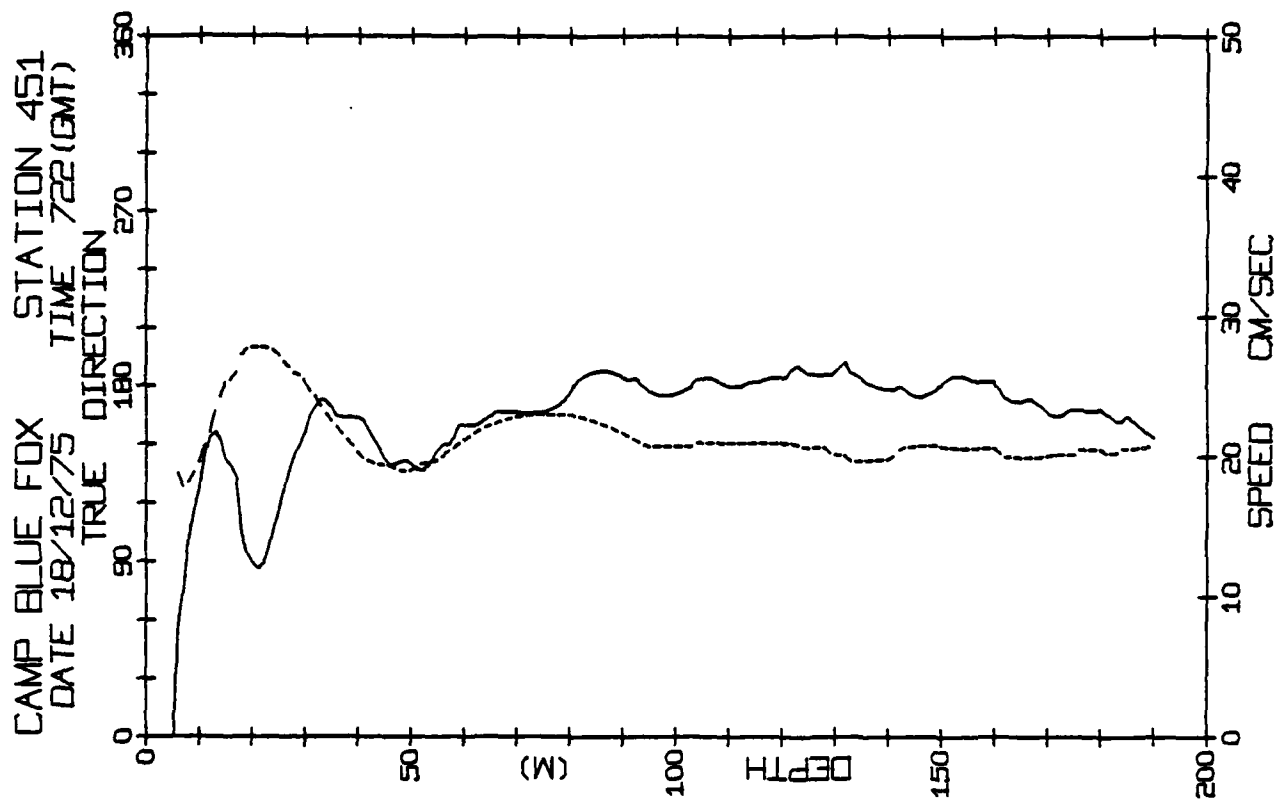


CAMP BLUE FOX STATION 449
DATE 17/12/75 TIME 729 (GMT)



CAMP BLUE FOX STATION 448
DATE 16/12/75 TIME 2105 (GMT)





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FEB 80 T O MANLEY, K HUNKINS, W TIEMANN

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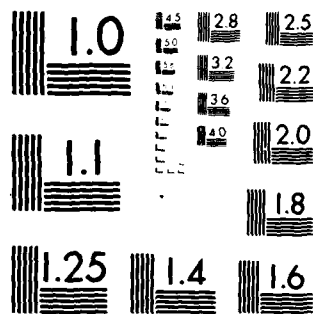
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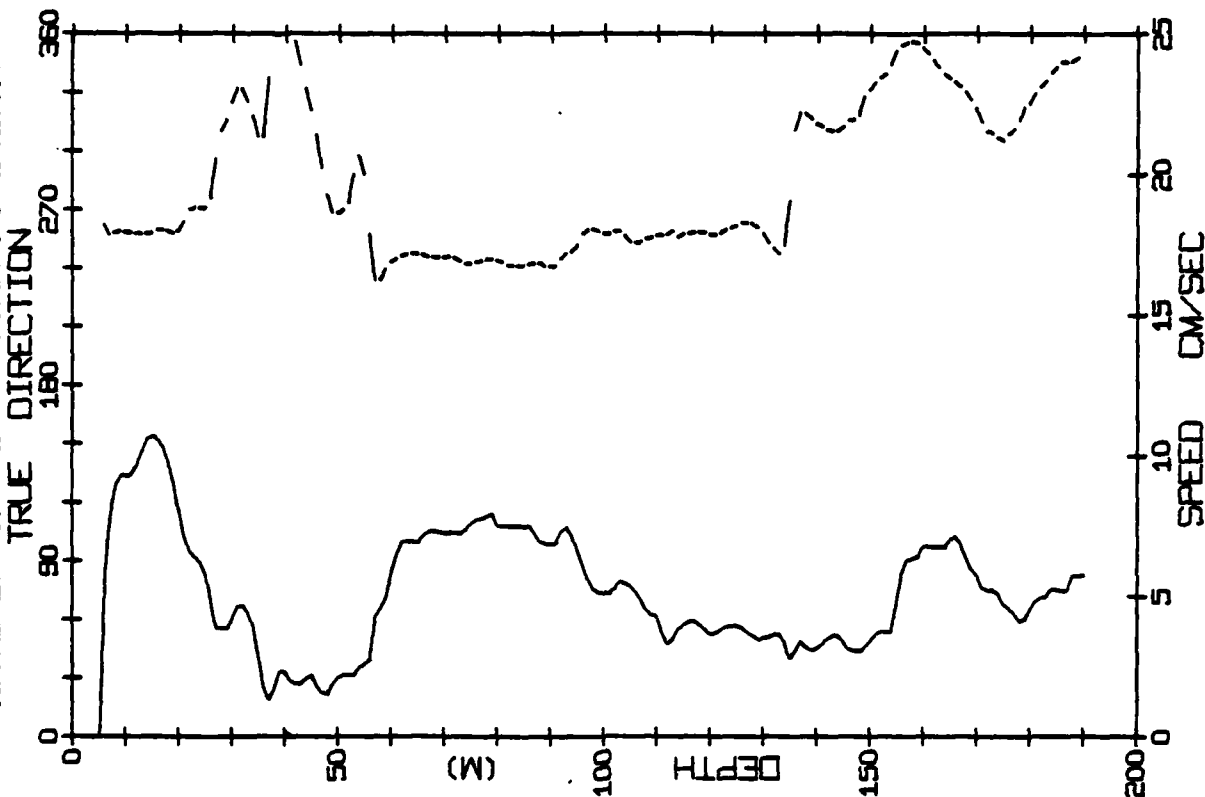
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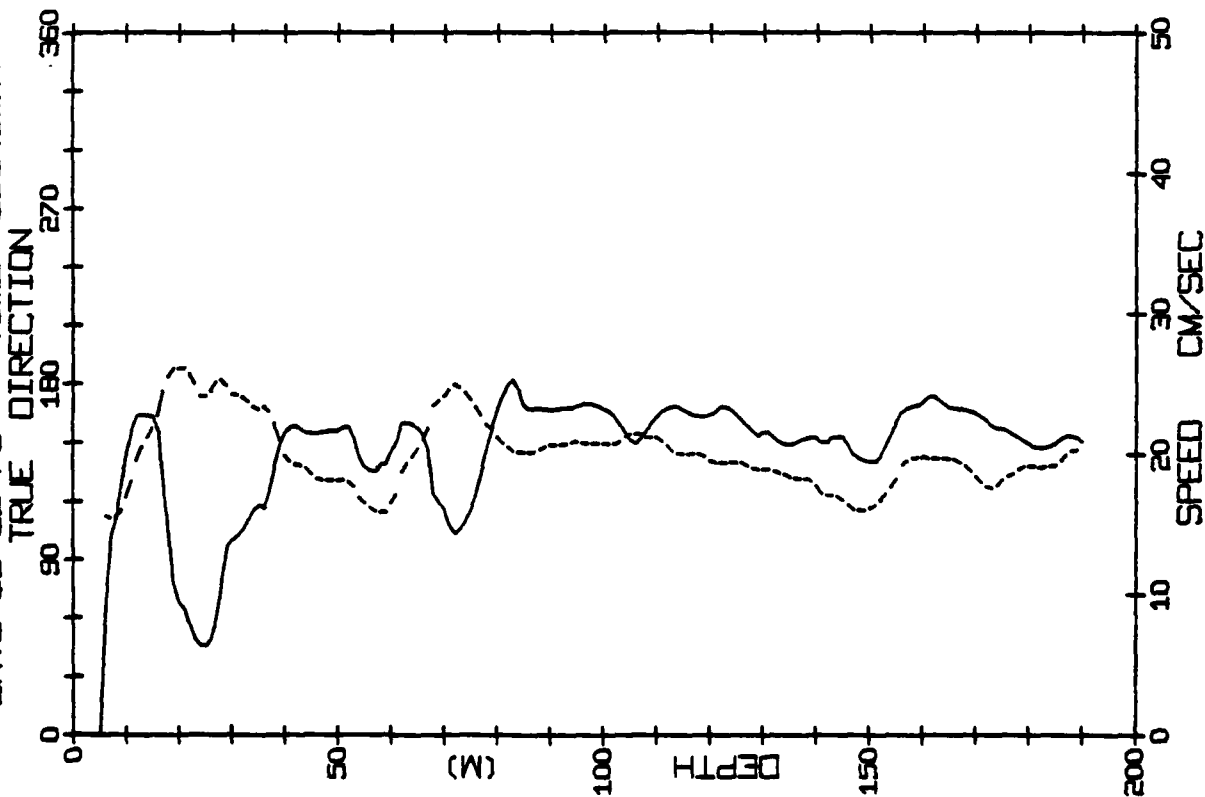


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

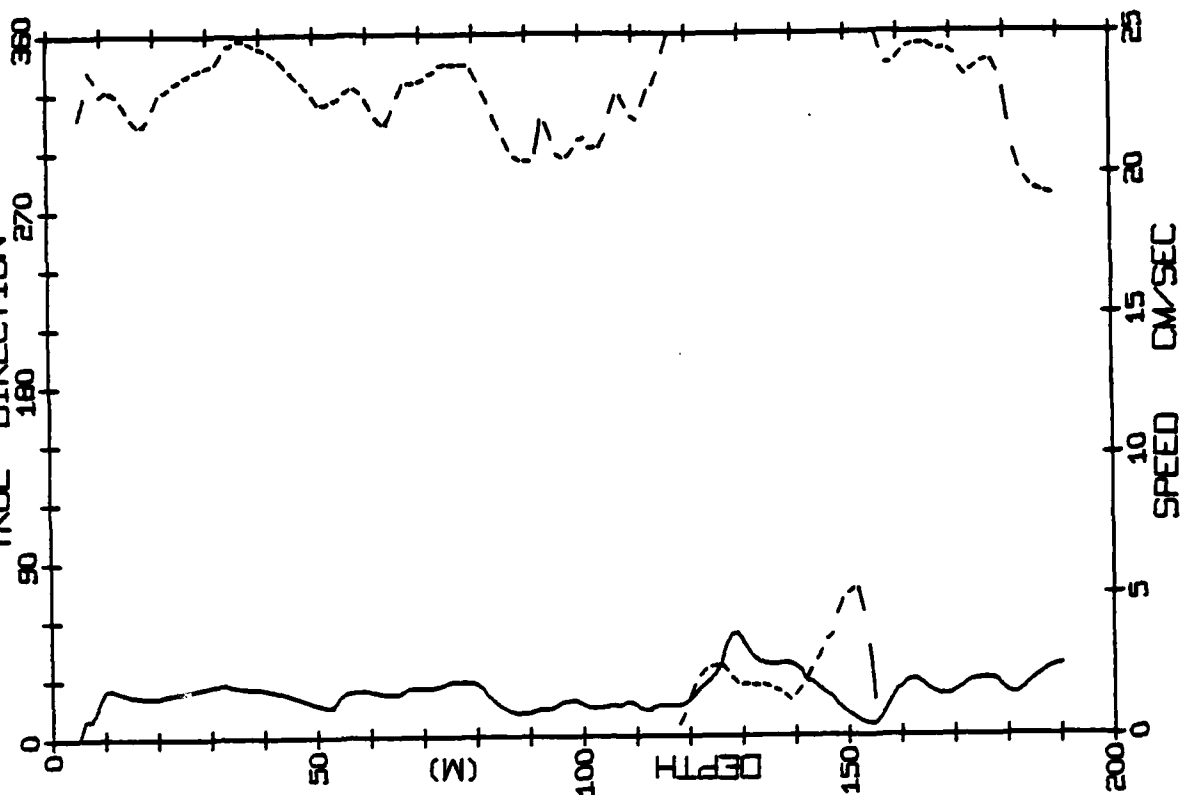
CAMP BLUE FOX STATION 470
 DATE 27/12/75 TIME 2105 (GMT)



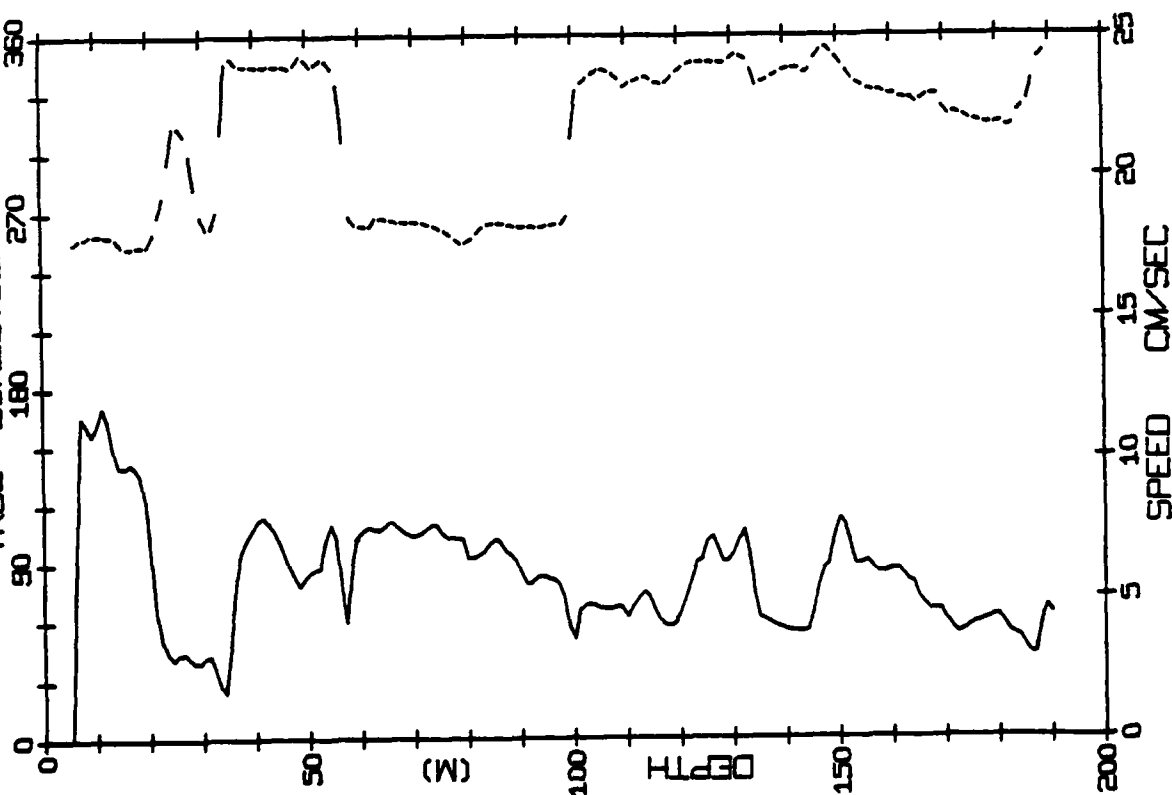
CAMP BLUE FOX STATION 452
 DATE 19/12/75 TIME 151 (GMT)

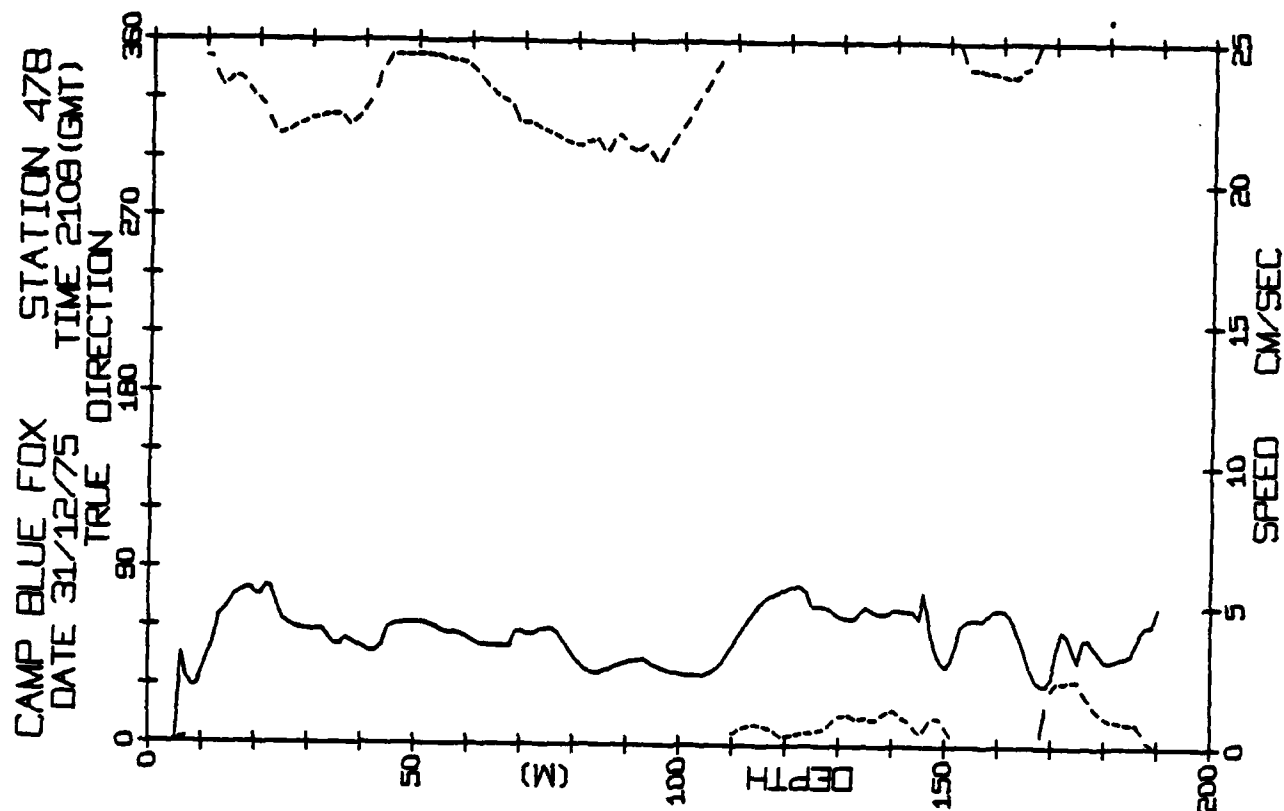
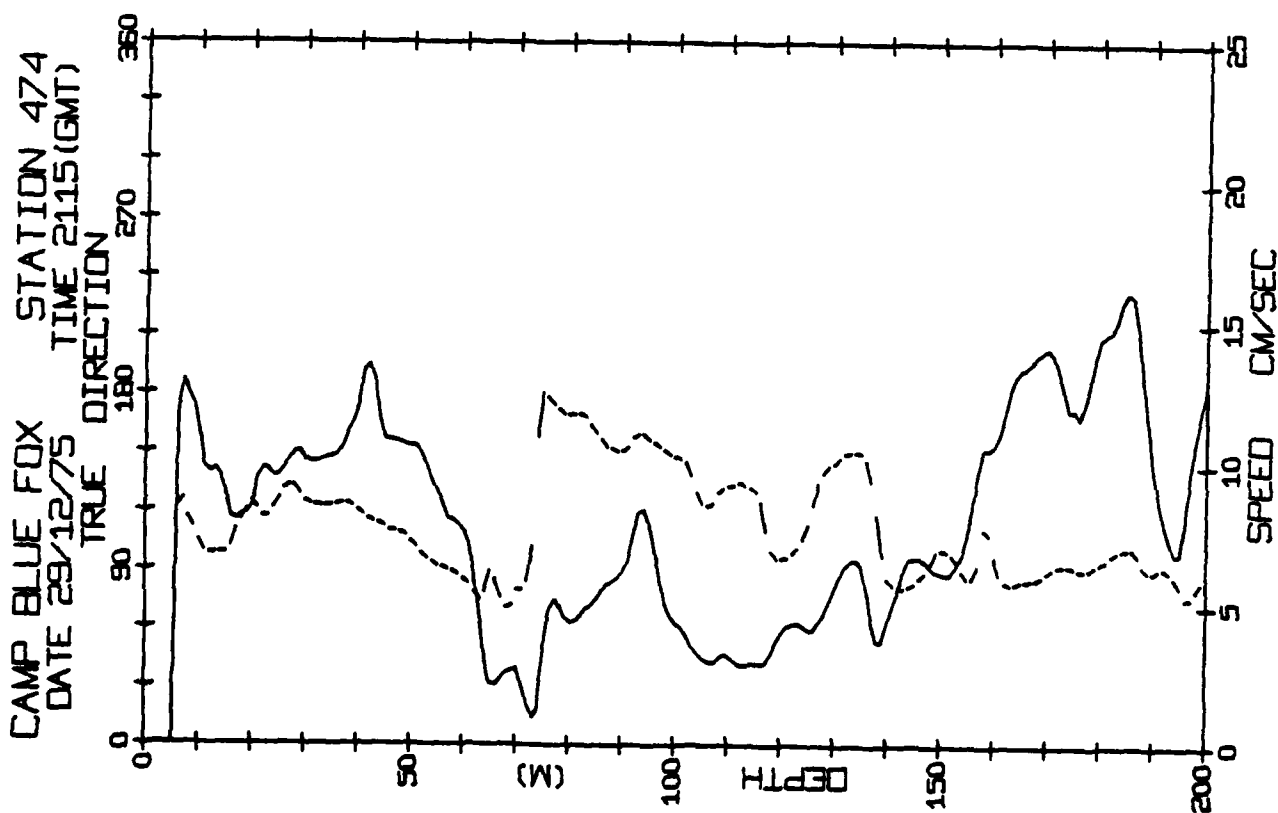


CAMP BLUE FOX STATION 472
 DATE 28/12/75 TIME 2109 (GMT)
 TRUE DIRECTION

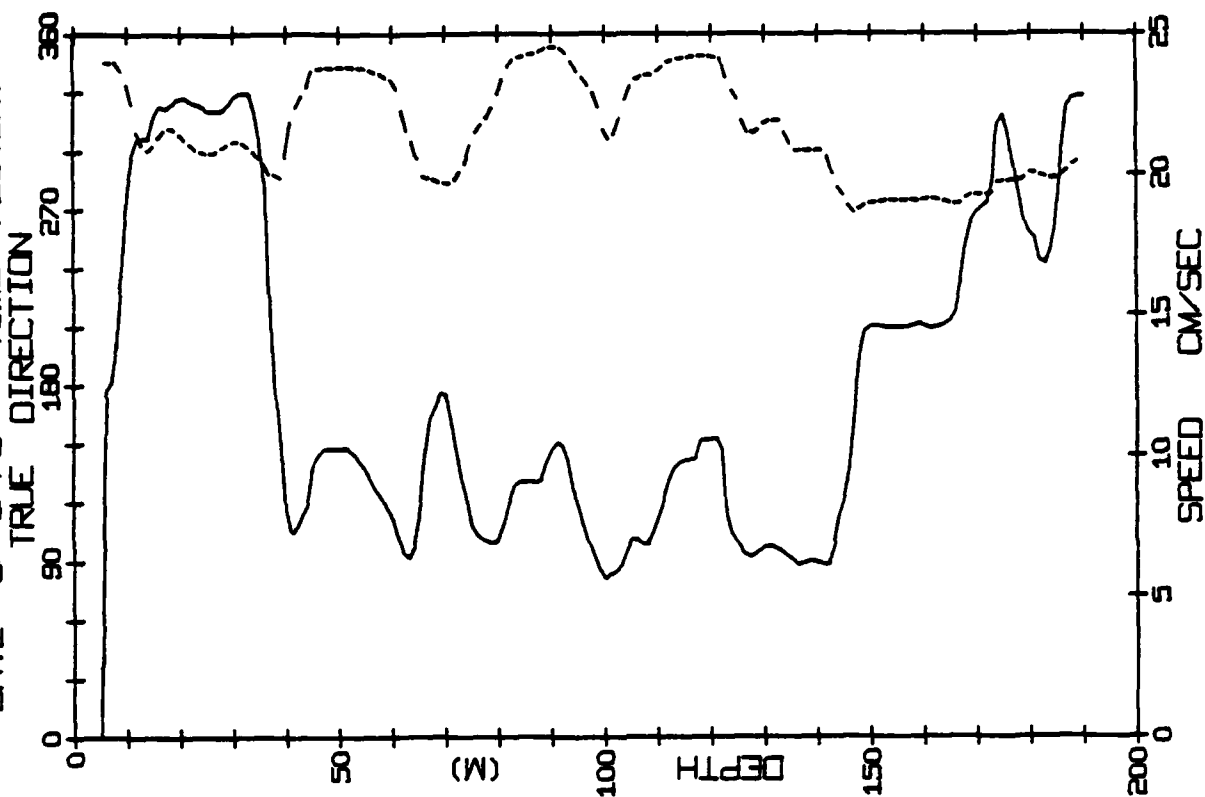


CAMP BLUE FOX STATION 471
 DATE 28/12/75 TIME 705 (GMT)
 TRUE DIRECTION

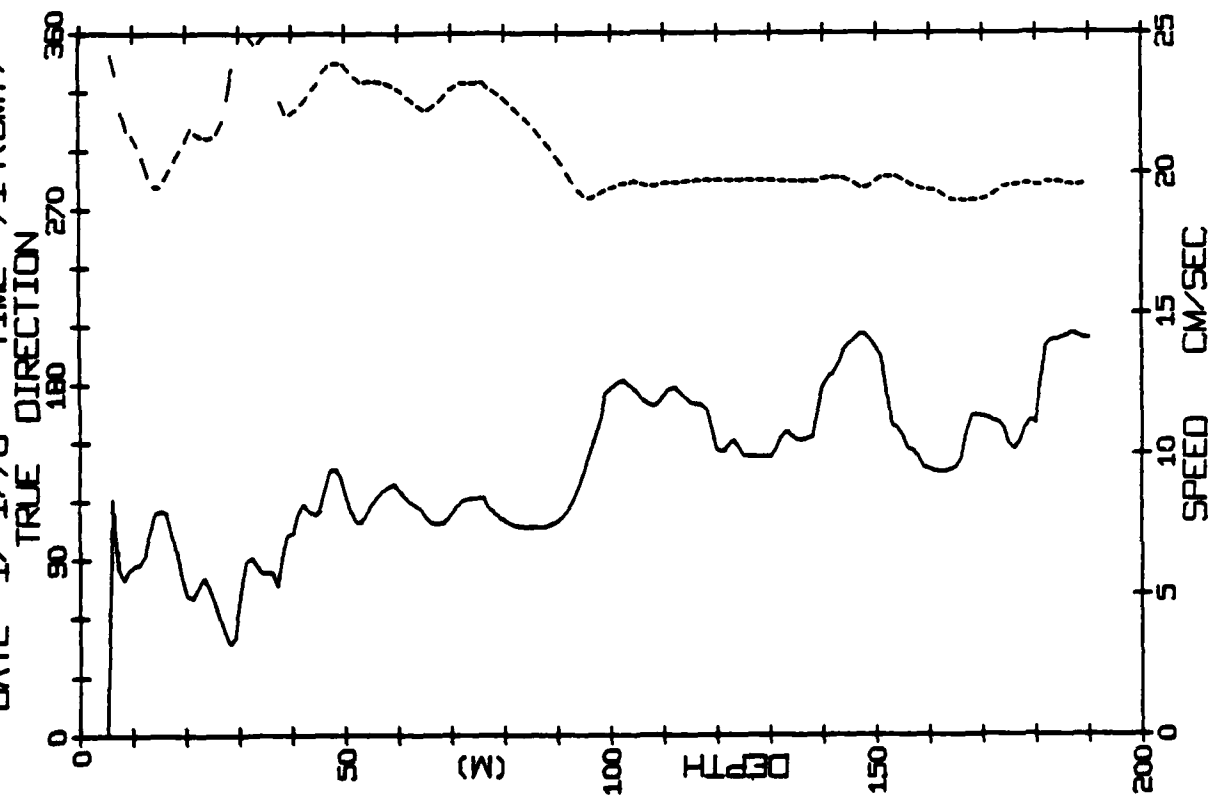


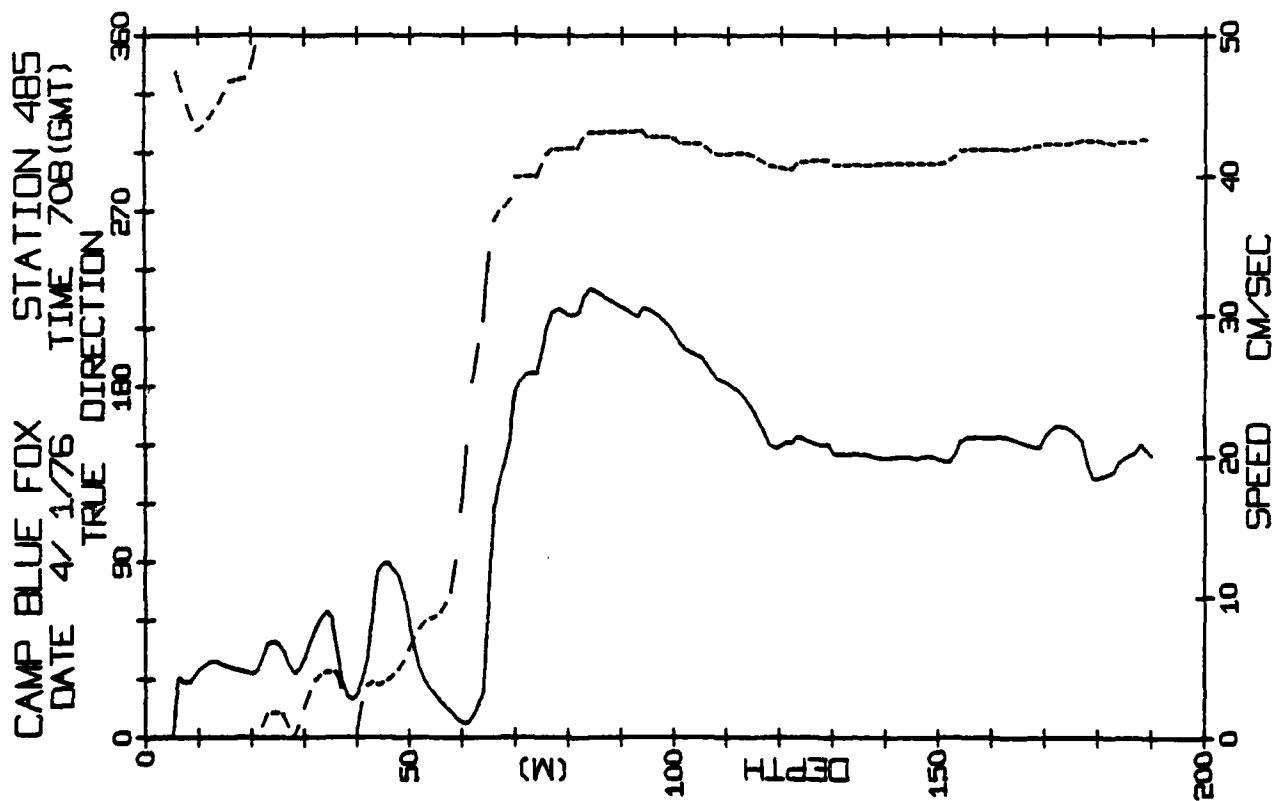
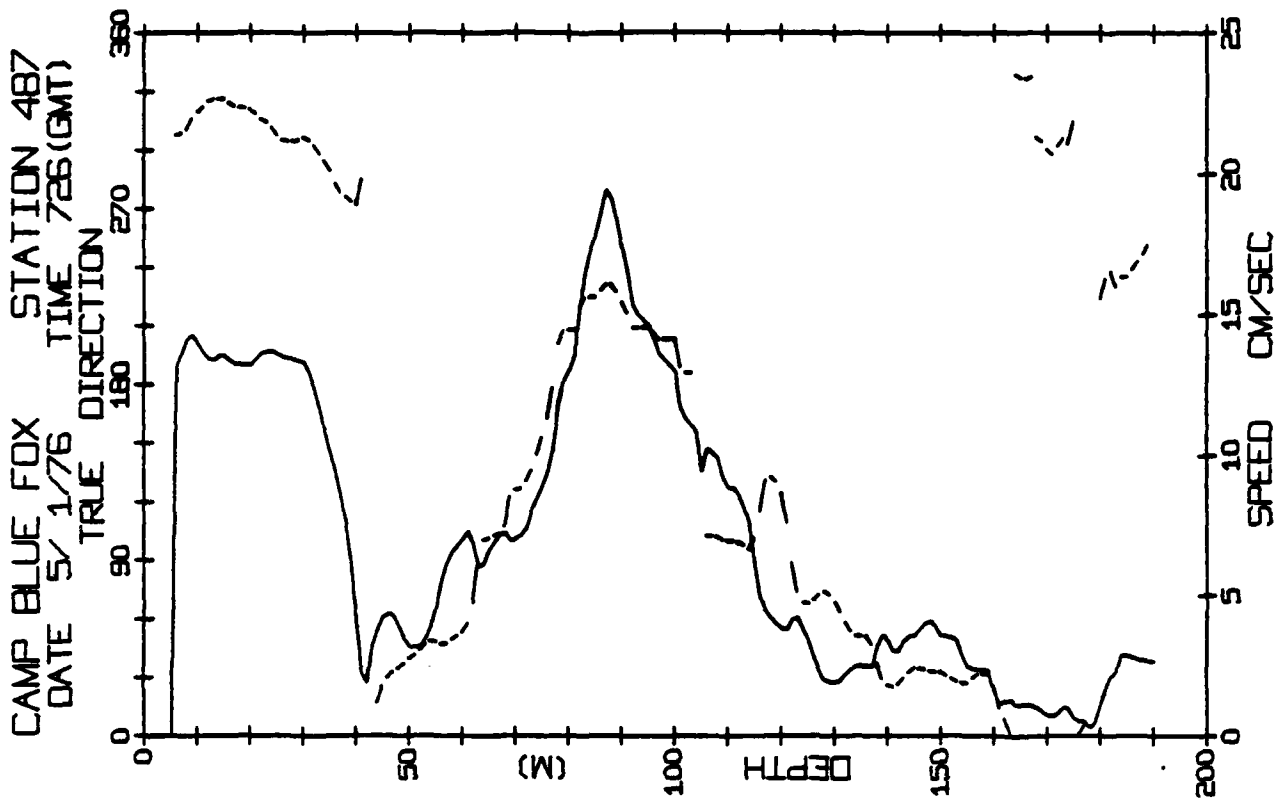


CAMP BLUE FOX STATION 483
DATE 3/1/76 TIME 726 (GMT)

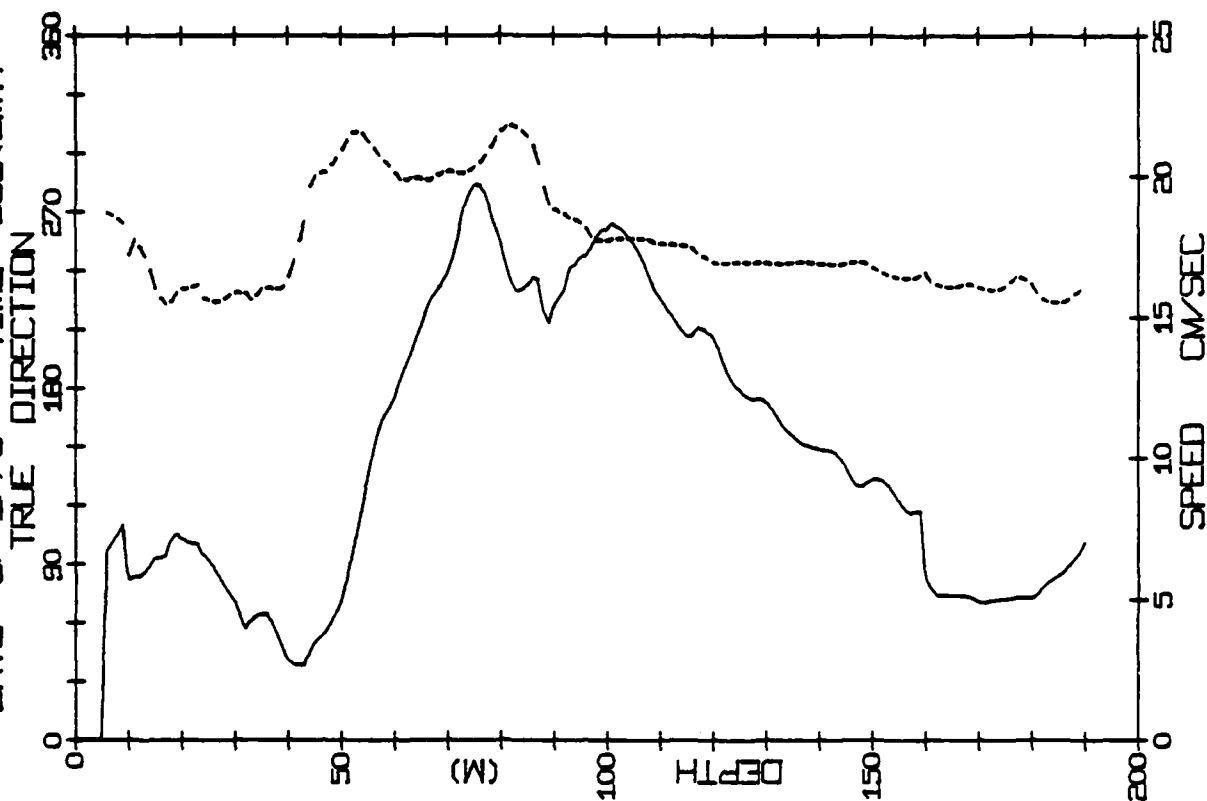


CAMP BLUE FOX STATION 479
DATE 1/1/76 TIME 714 (GMT)

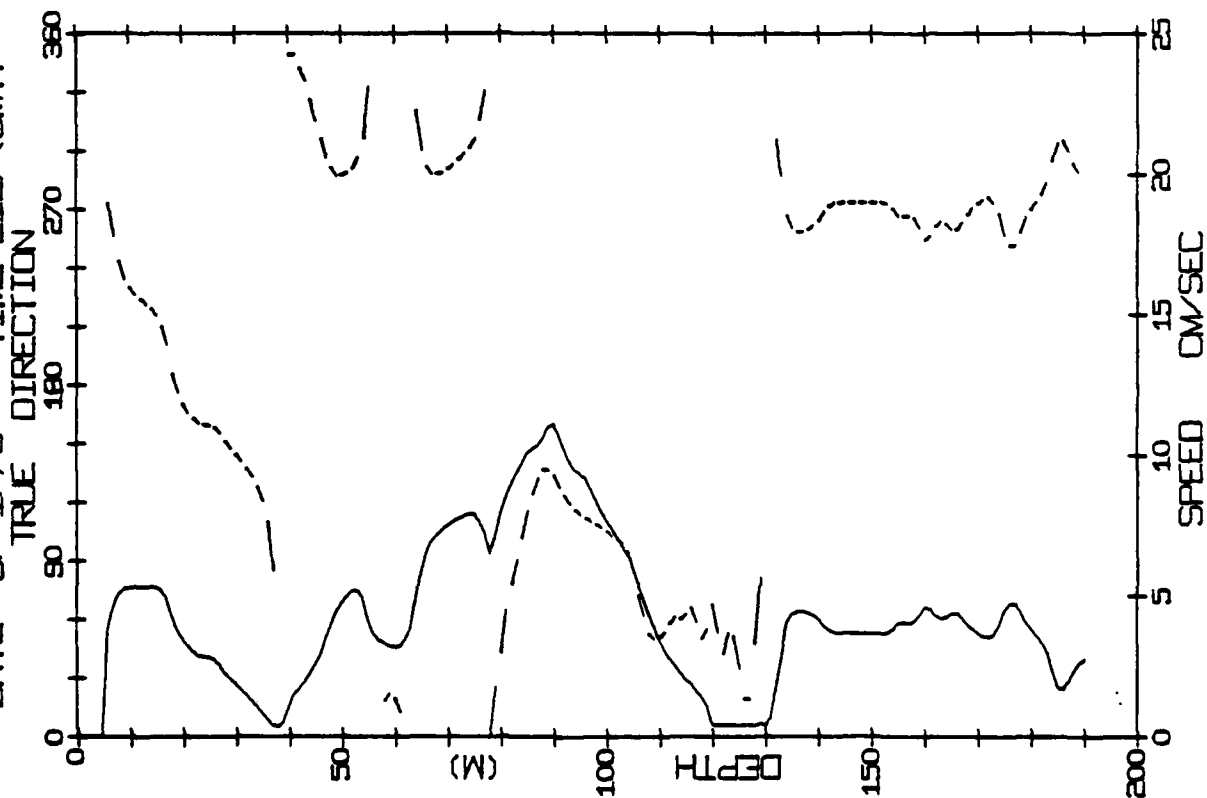




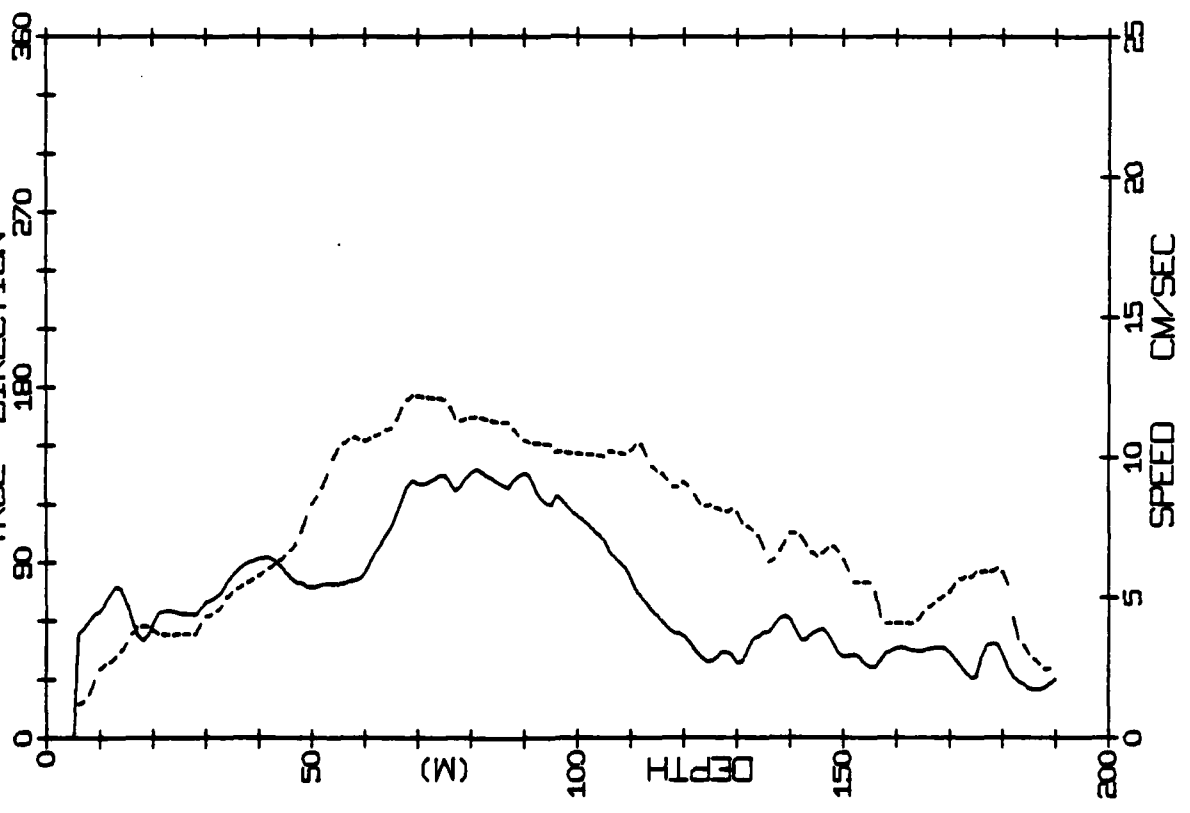
CAMP BLUE FOX STATION 489
DATE 6/1/76 TIME 538 (GMT)



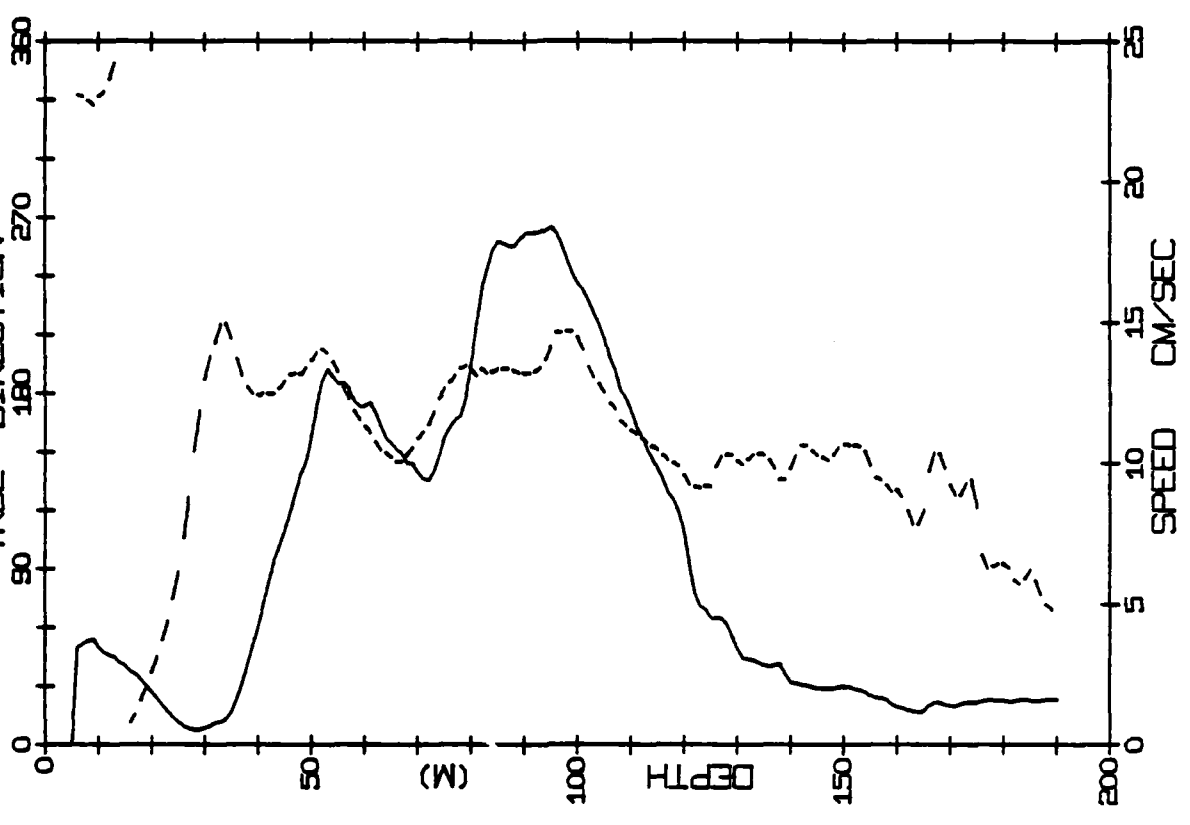
CAMP BLUE FOX STATION 488
DATE 5/1/76 TIME 2127 (GMT)

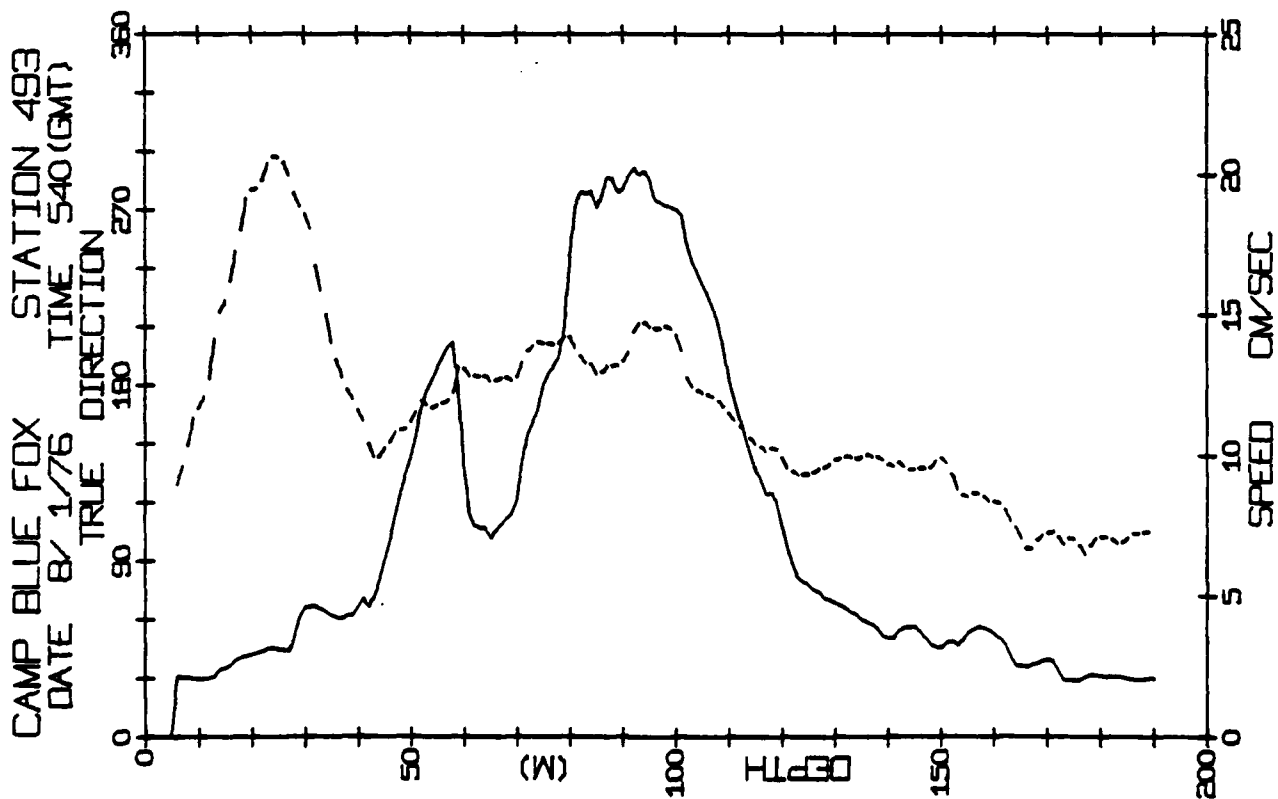
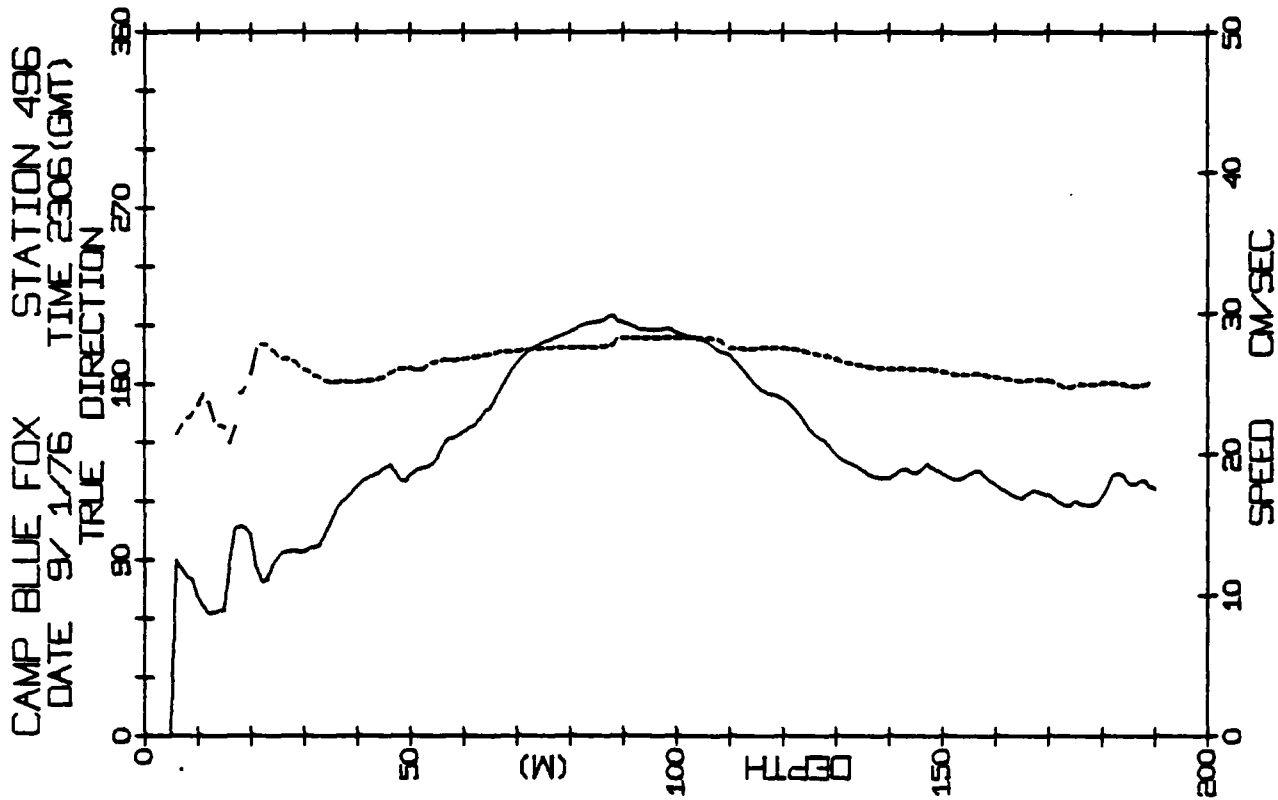


CAMP BLUE FOX STATION 491
 DATE 7/1/76 TIME 541(GMT)
 TRUE DIRECTION

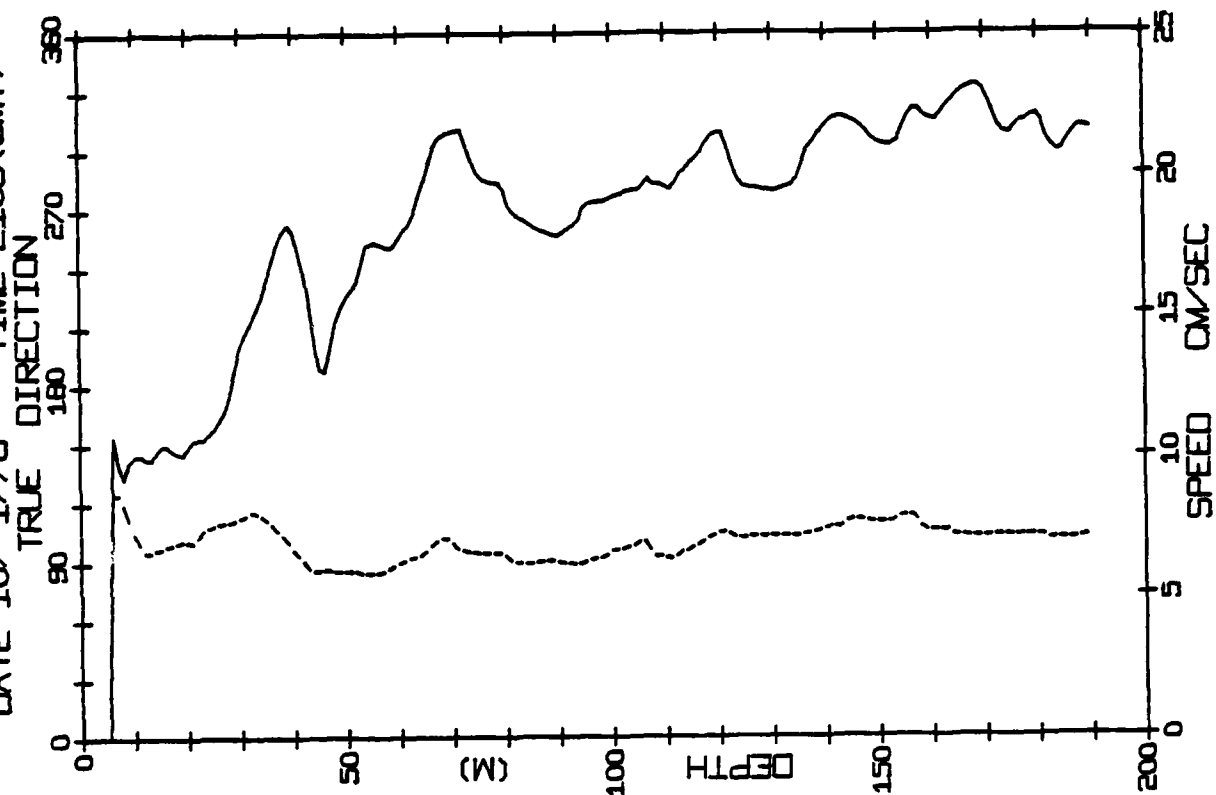


CAMP BLUE FOX STATION 492
 DATE 7/1/76 TIME 2112(GMT)
 TRUE DIRECTION

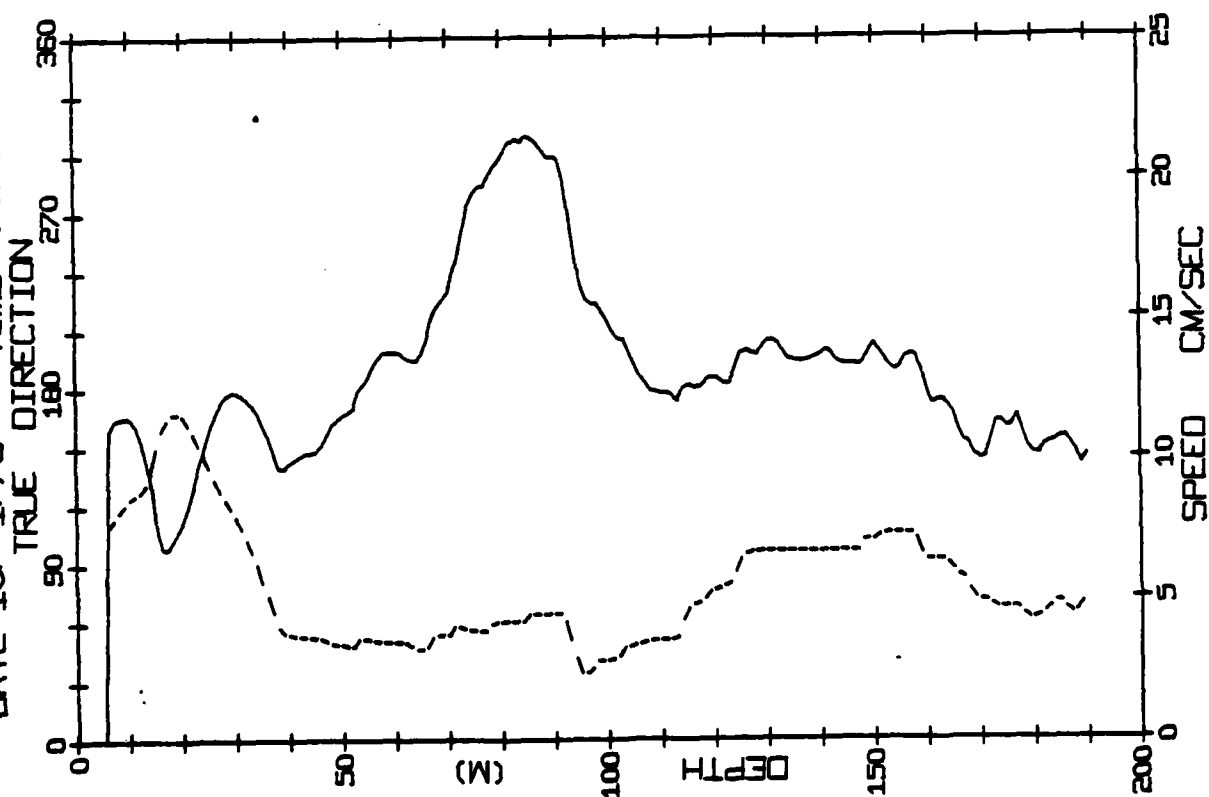




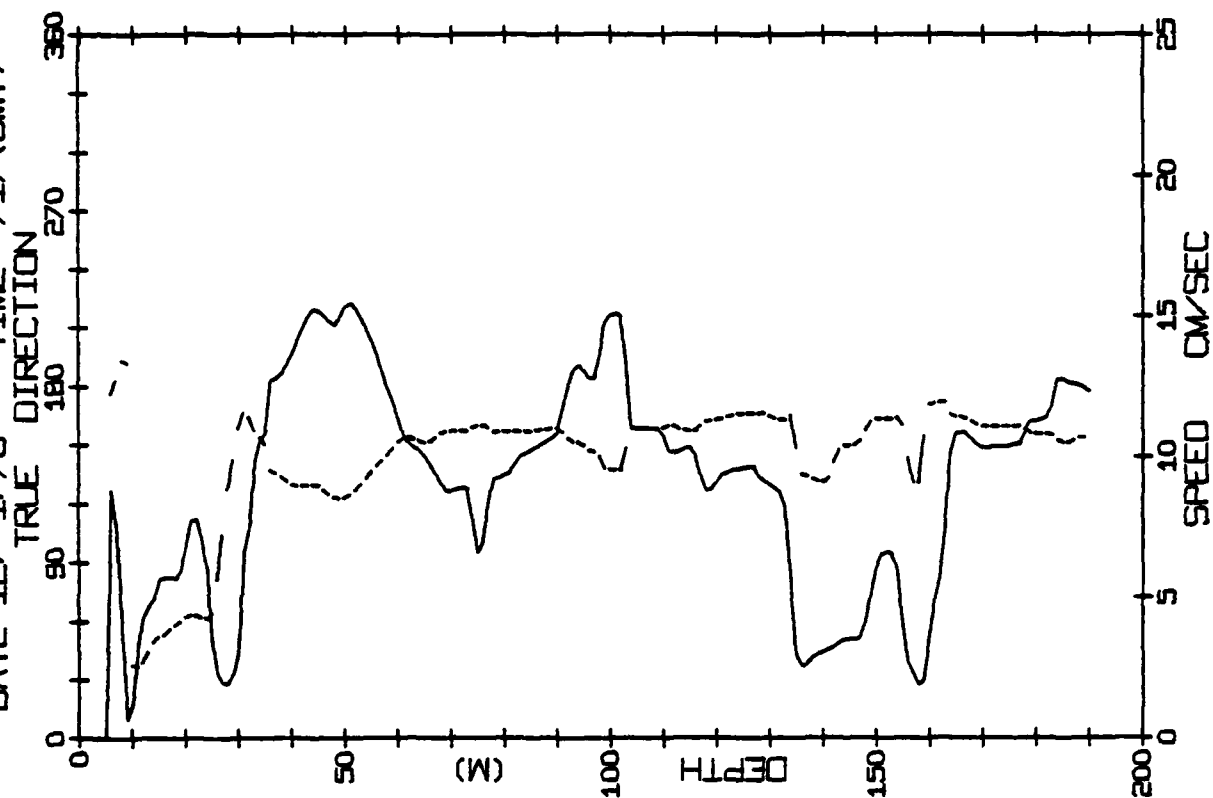
CAMP BLUE FOX STATION 498
DATE 10/ 1/76 TIME 2109(GMT)



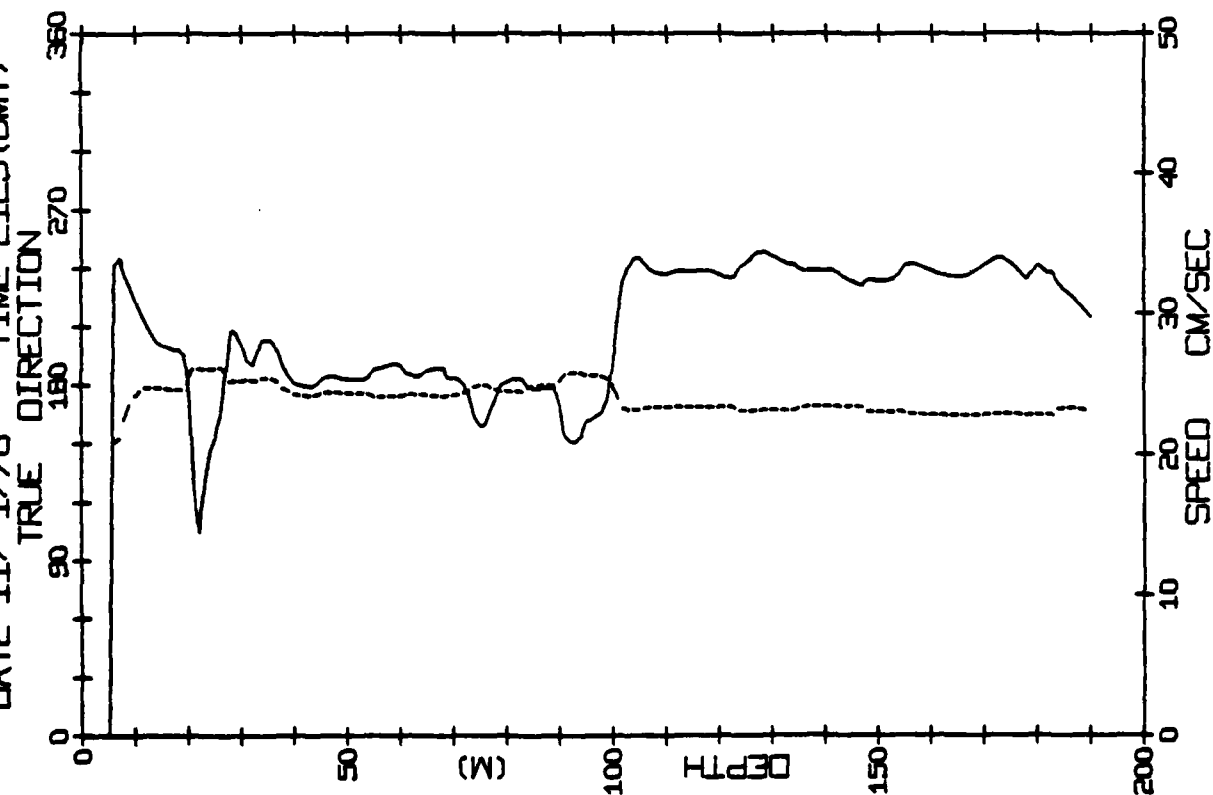
CAMP BLUE FOX STATION 497
DATE 10/ 1/76 TIME 707 (GMT)



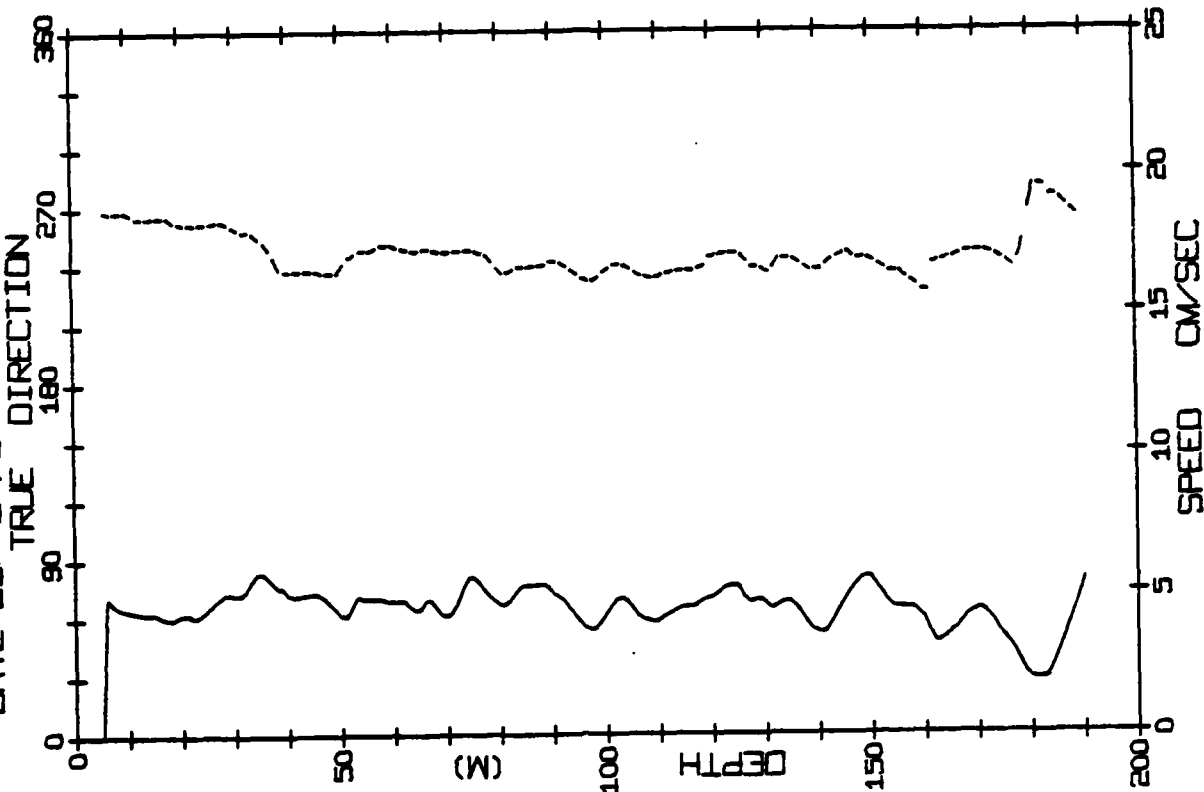
CAMP BLUE FOX STATION 501
DATE 12/ 1/76 TIME 717 (GMT)



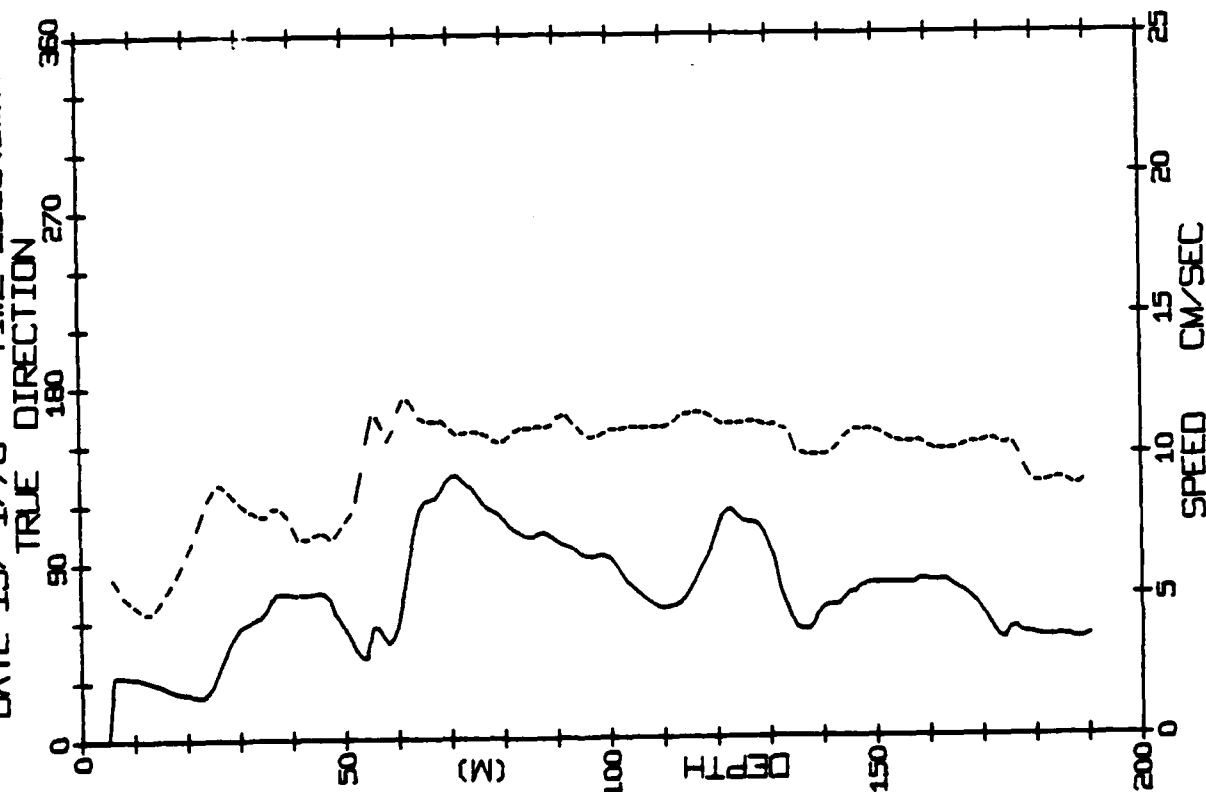
CAMP BLUE FOX STATION 500
DATE 11/ 1/76 TIME 2129 (GMT)



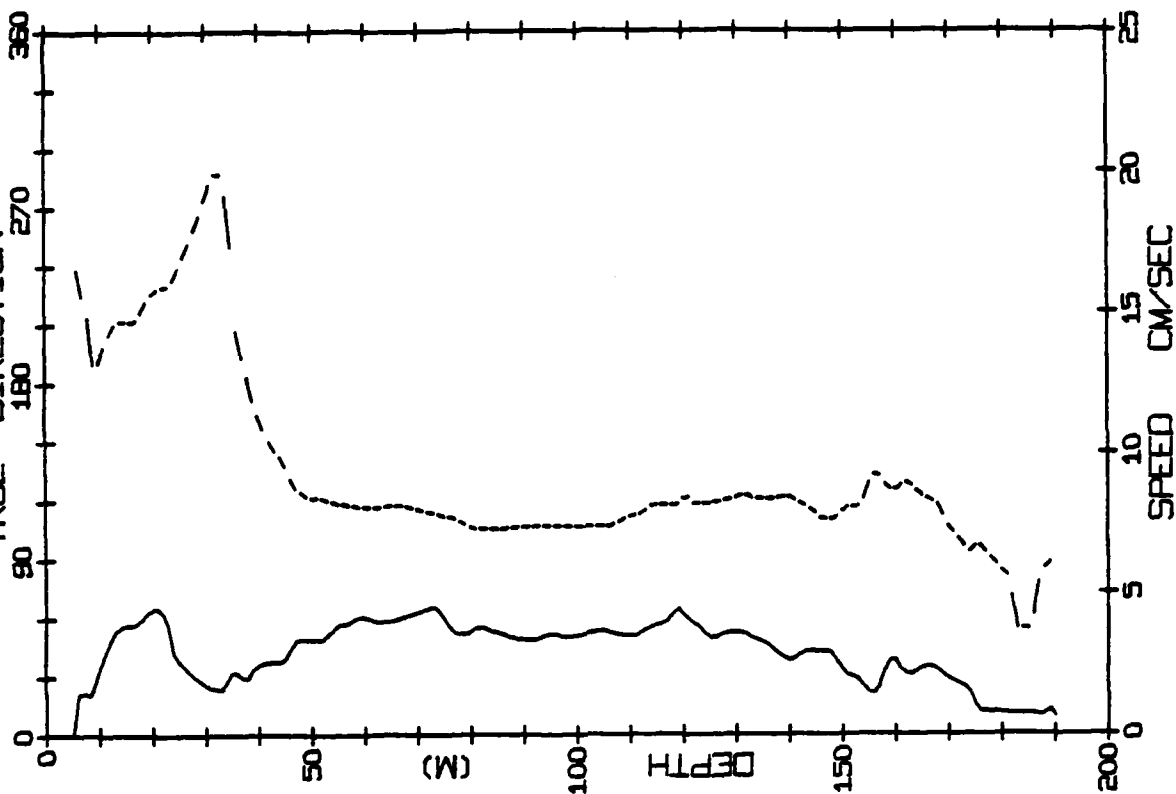
CAMP BLUE FOX STATION 520
DATE 21/ 1/76 TIME 2105(GMT)



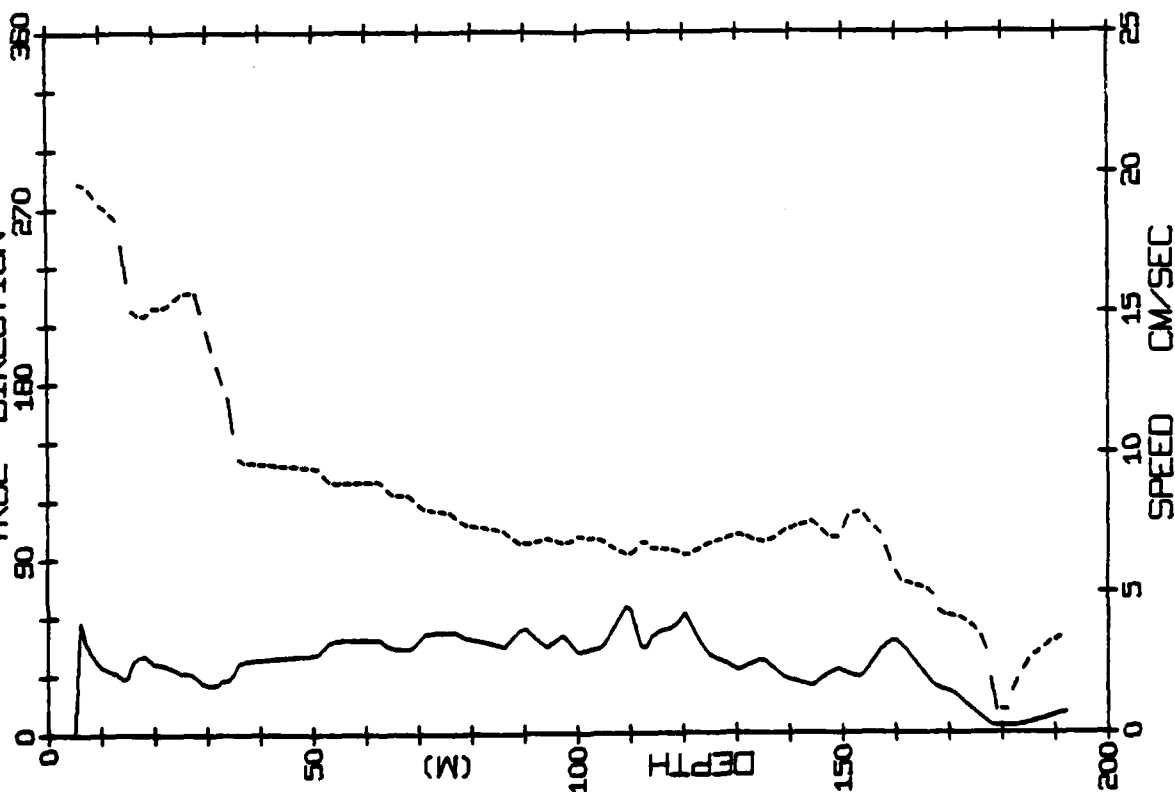
CAMP BLUE FOX STATION 516
DATE 19/ 1/76 TIME 2113(GMT)



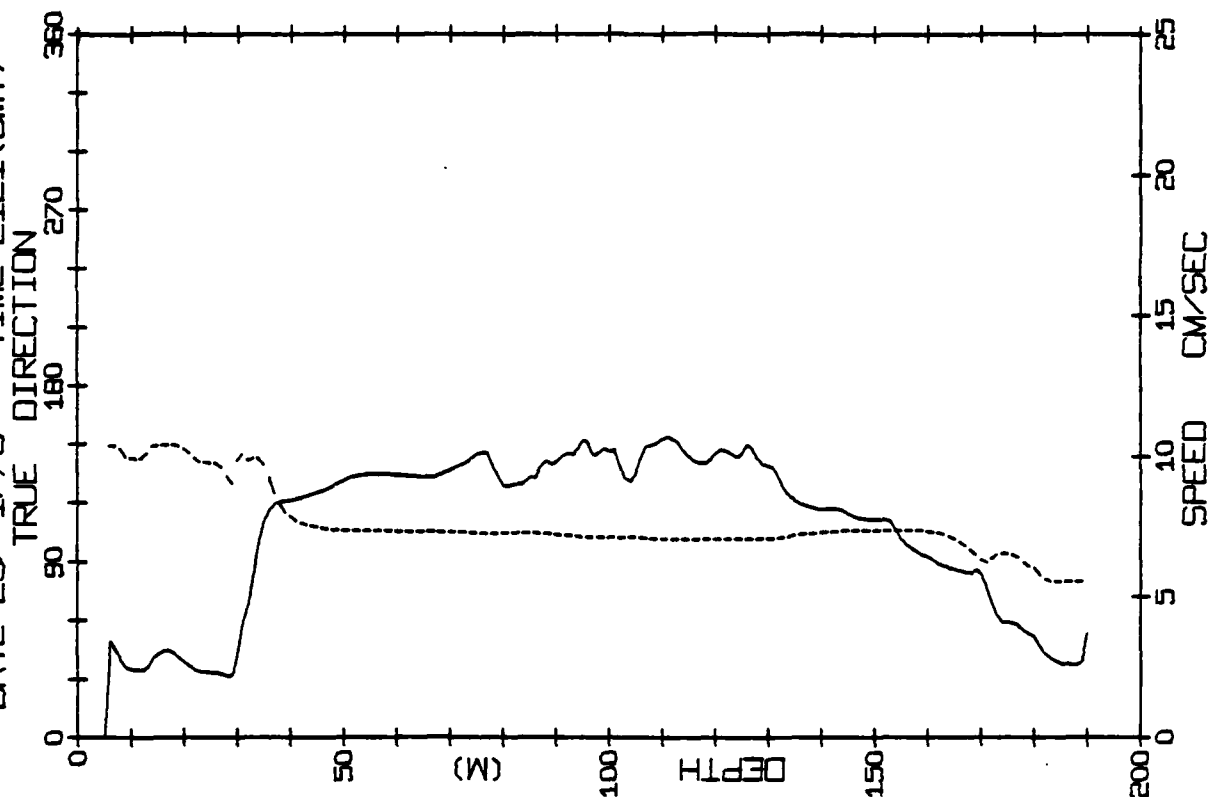
CAMP BLUE FOX STATION 522
DATE 22/ 1/76 TIME 2111(GMT)
TRUE DIRECTION



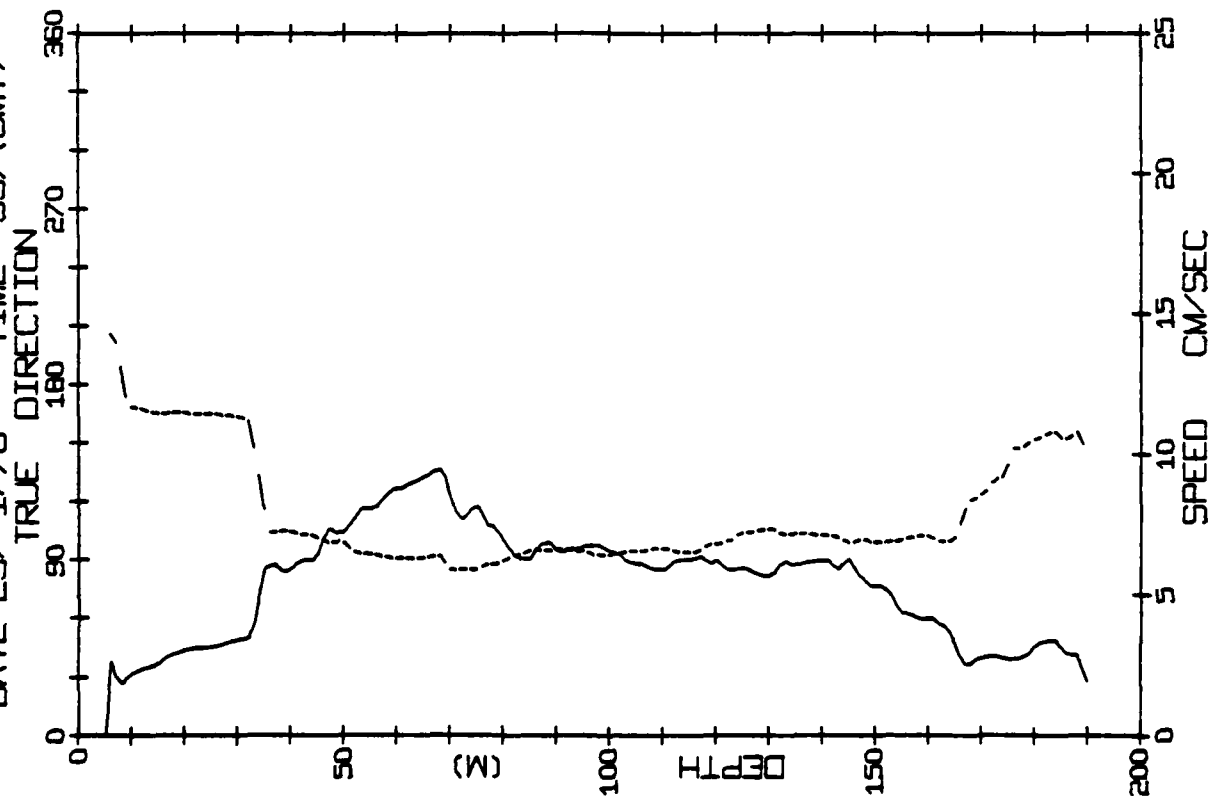
CAMP BLUE FOX STATION 521
DATE 22/ 1/76 TIME 719(GMT)
TRUE DIRECTION



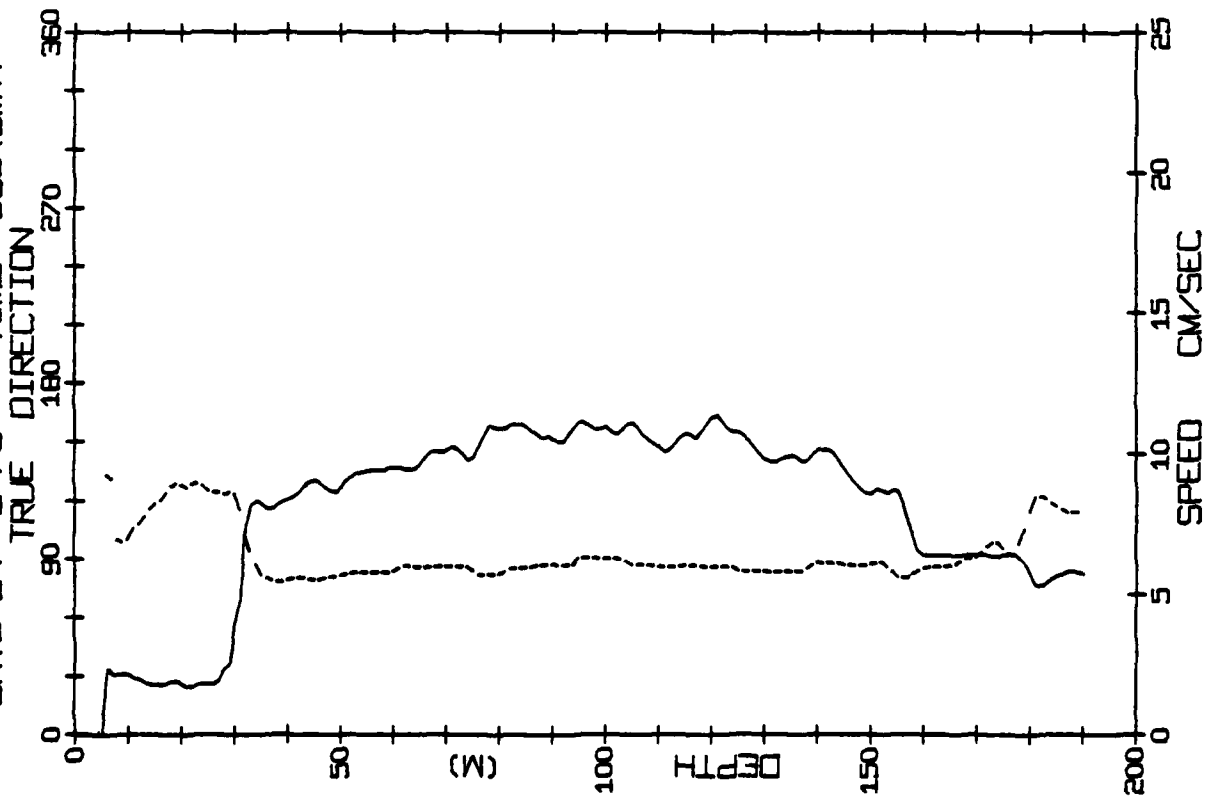
CAMP BLUE FOX STATION 524
DATE 23/1/76 TIME 2121 (GMT)



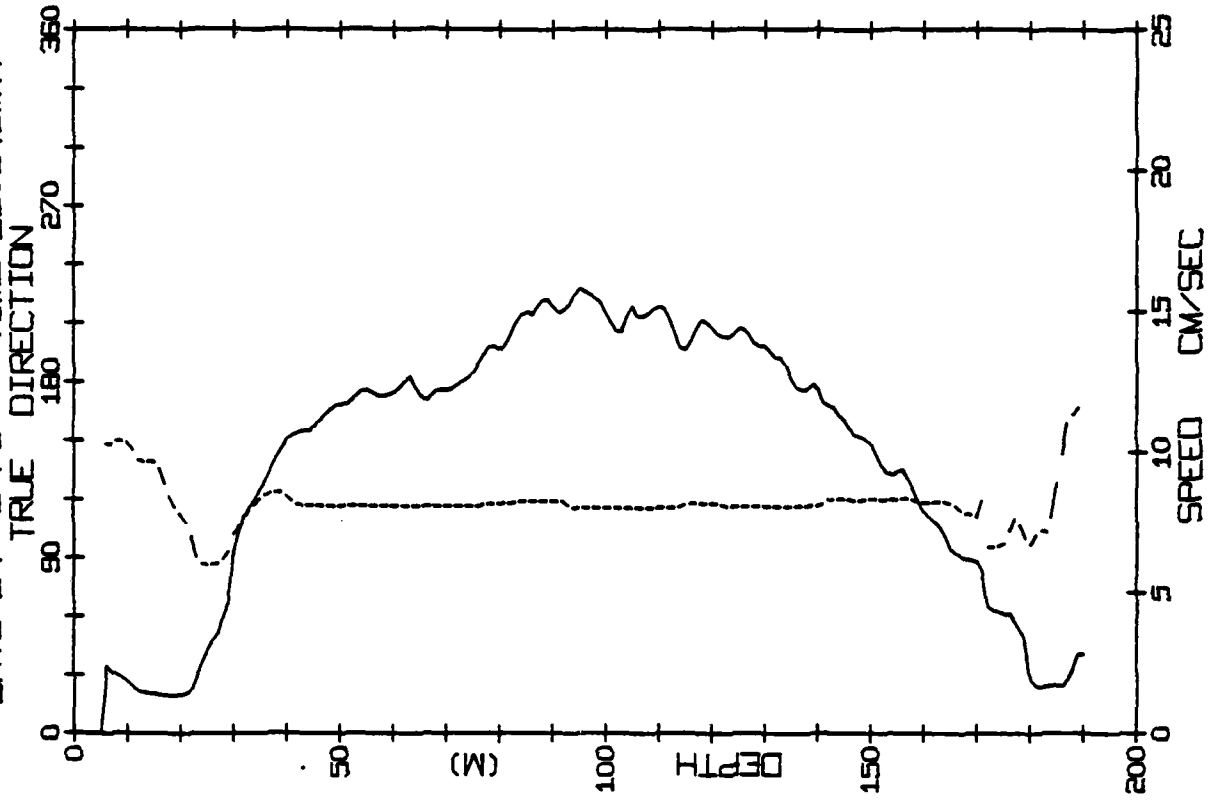
CAMP BLUE FOX STATION 523
DATE 23/1/76 TIME 537 (GMT)



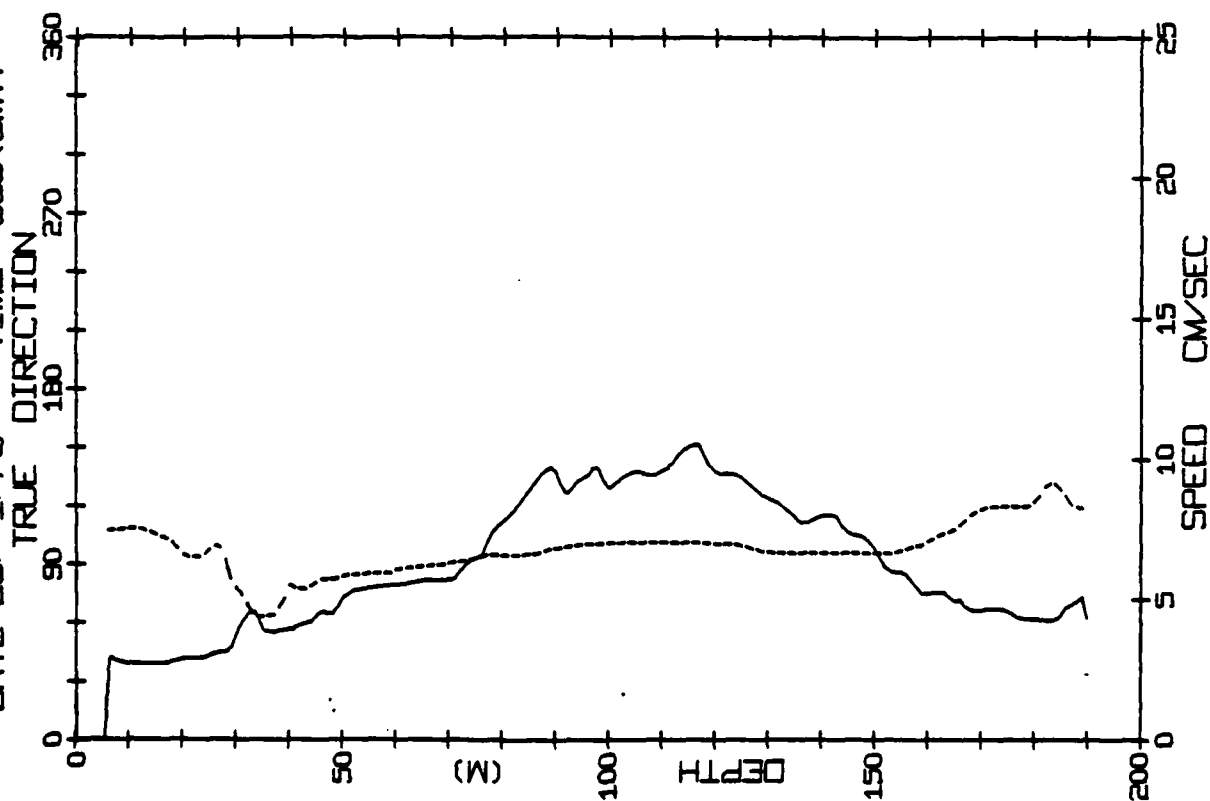
CAMP BLUE FOX STATION 525
DATE 24/ 1/76 TIME 536(GMT)



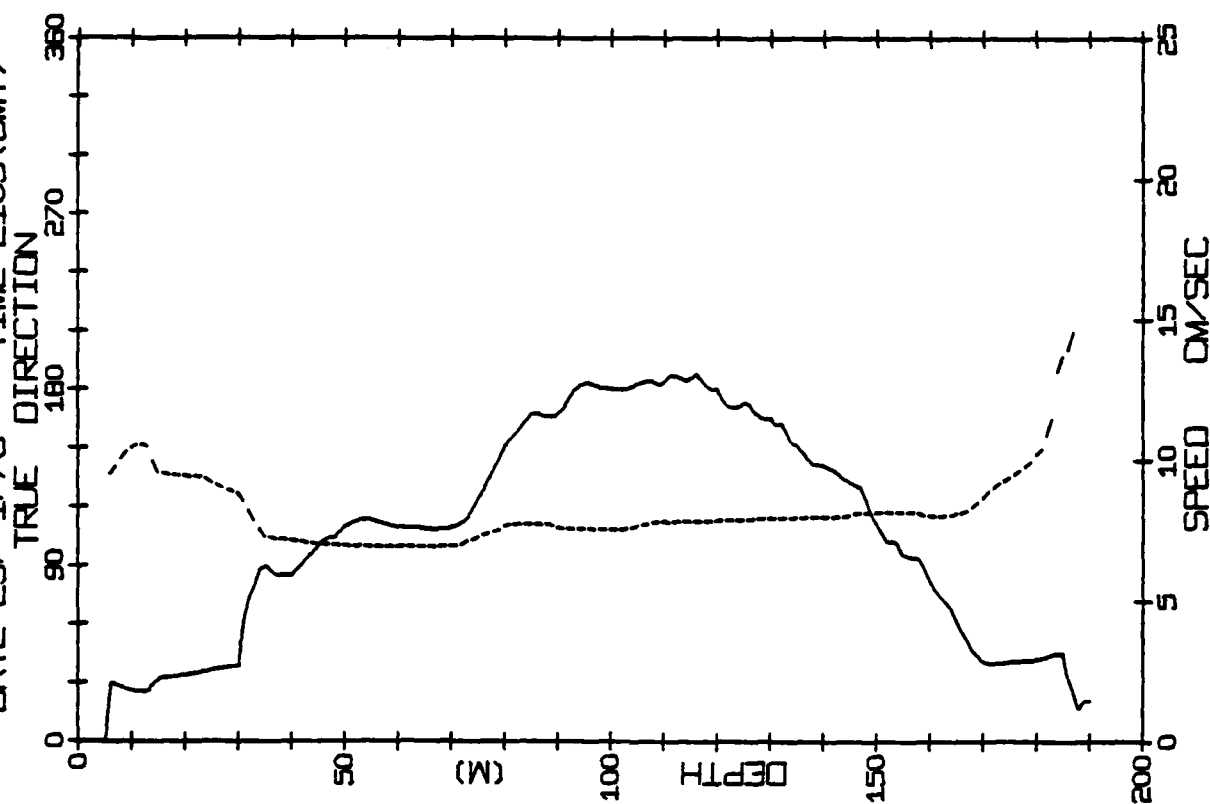
CAMP BLUE FOX STATION 526
DATE 24/ 1/76 TIME 2108(GMT)



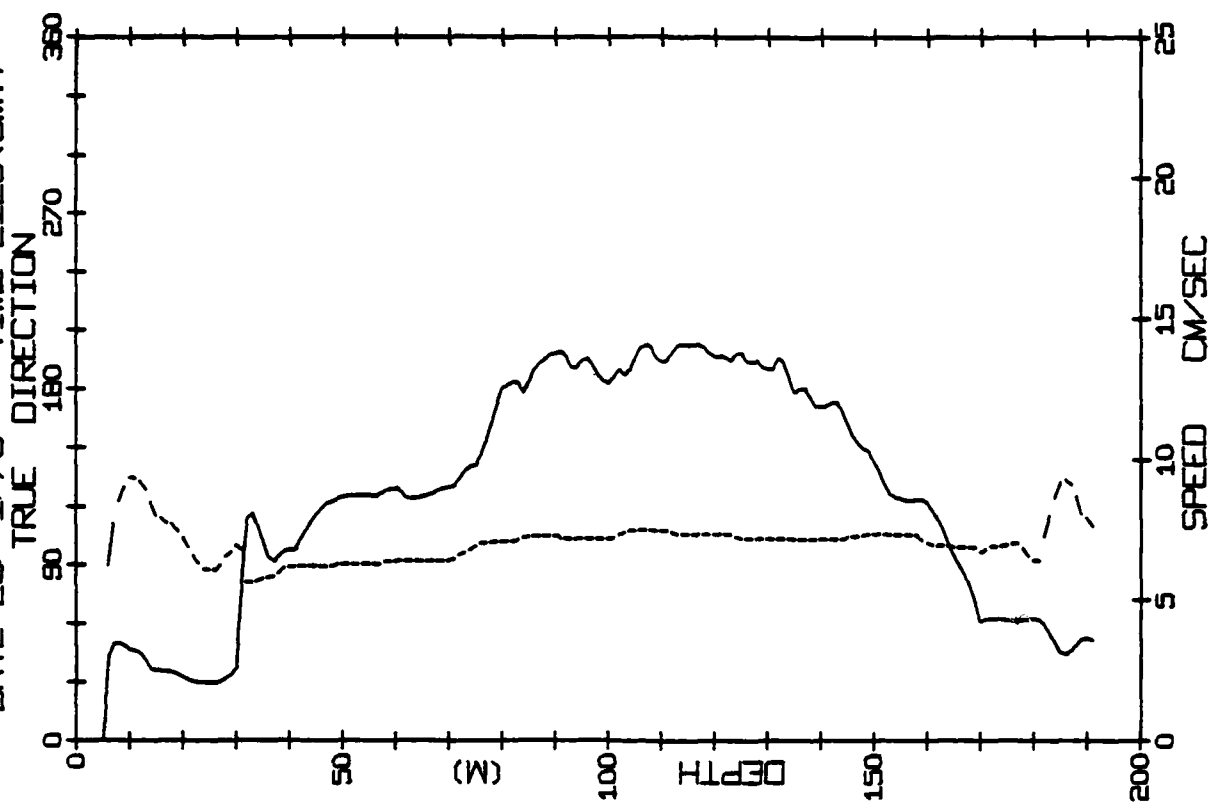
CAMP BLUE FOX STATION 527
DATE 25/1/76 TIME 535 (GMT)



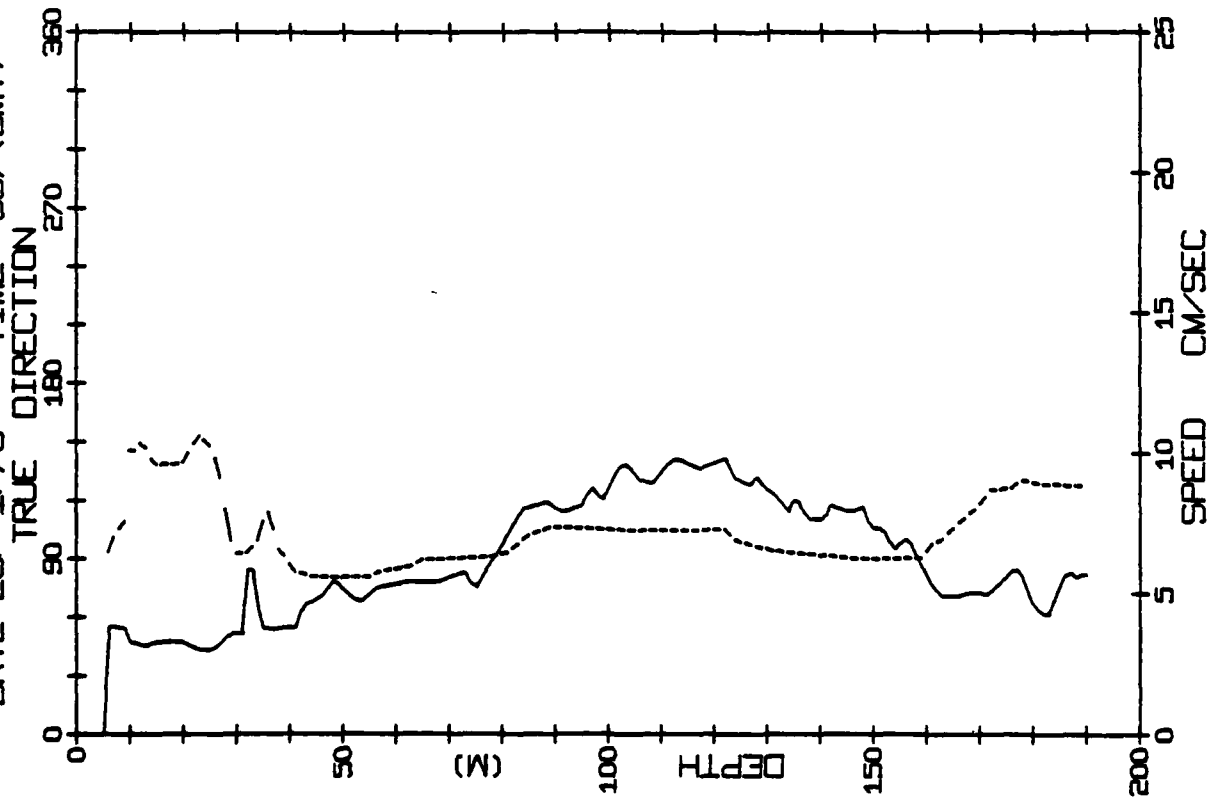
CAMP BLUE FOX STATION 528
DATE 25/1/76 TIME 2105 (GMT)



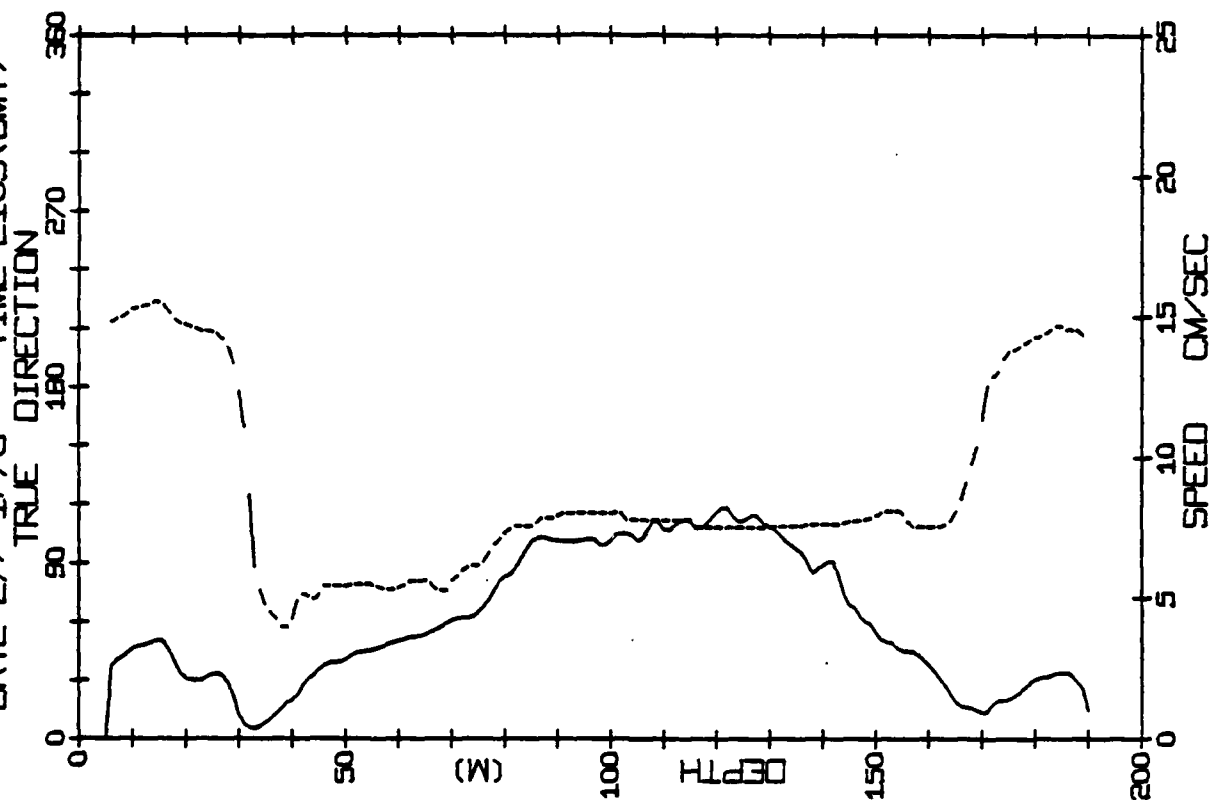
CAMP BLUE FOX STATION 530
DATE 26/1/76 TIME 2125 (GMT)



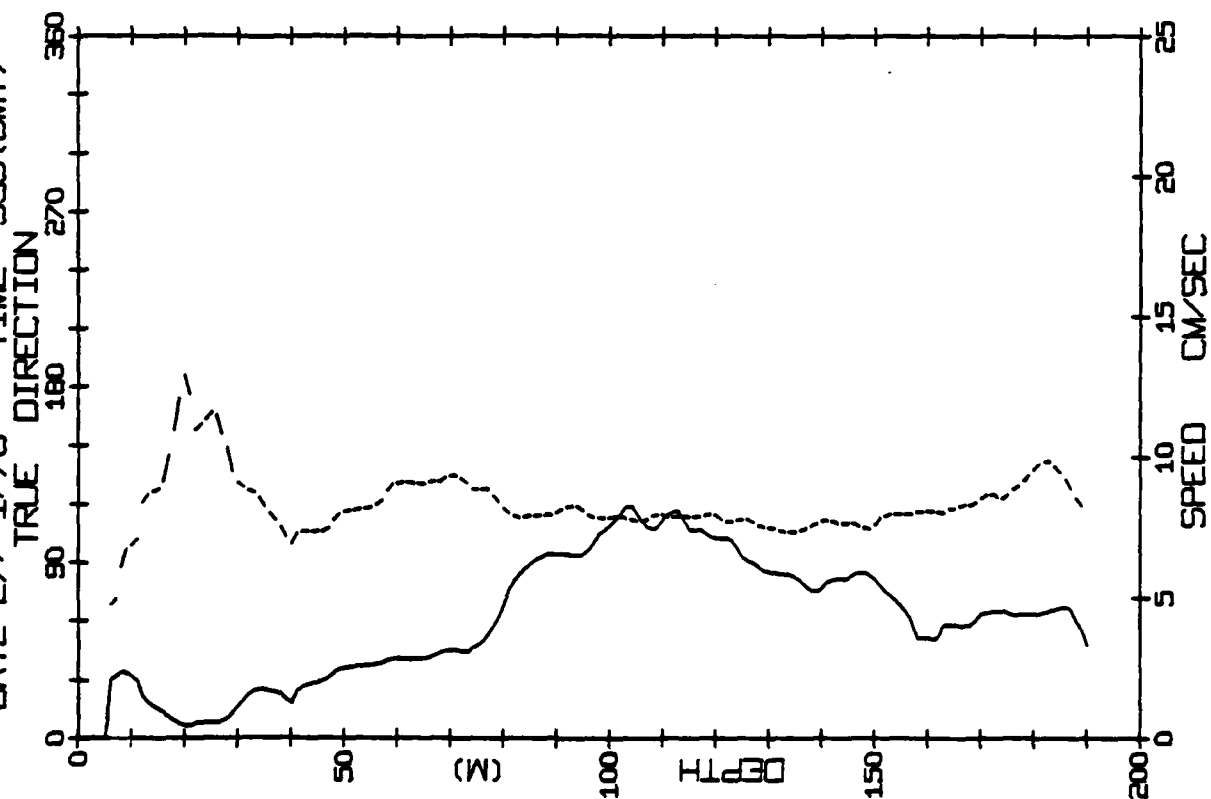
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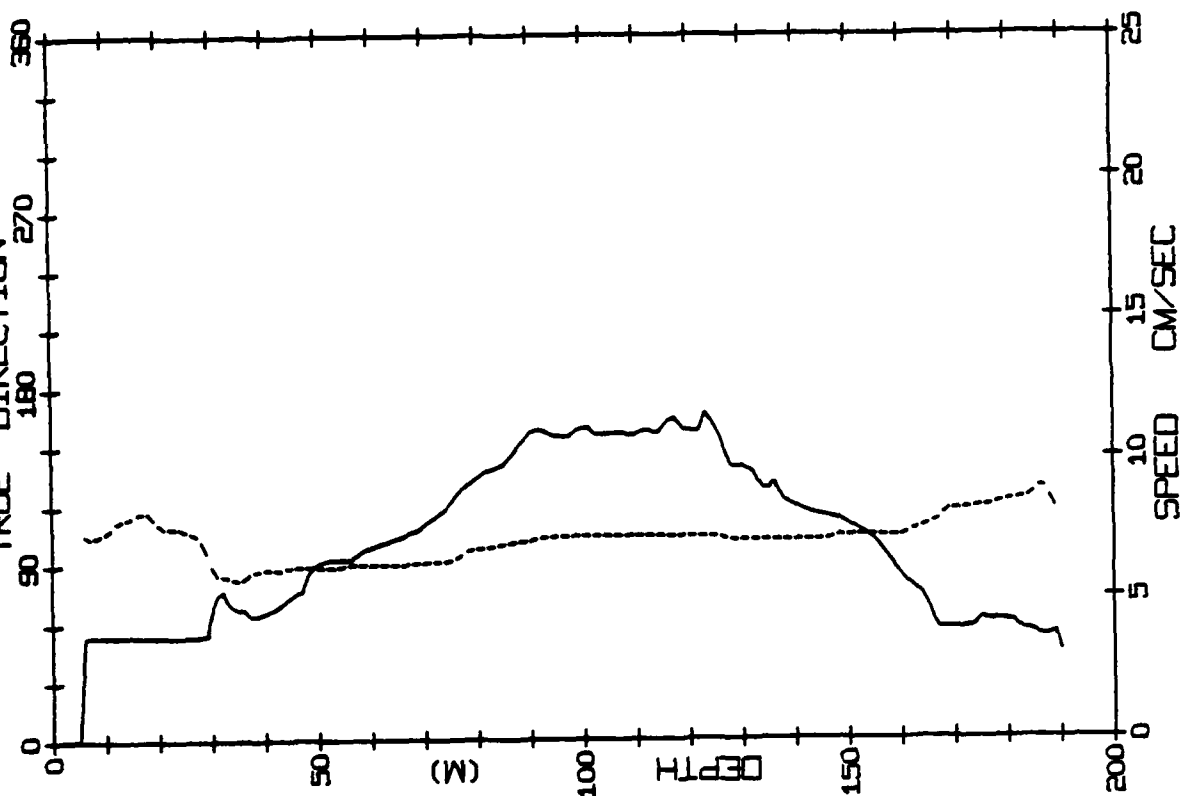
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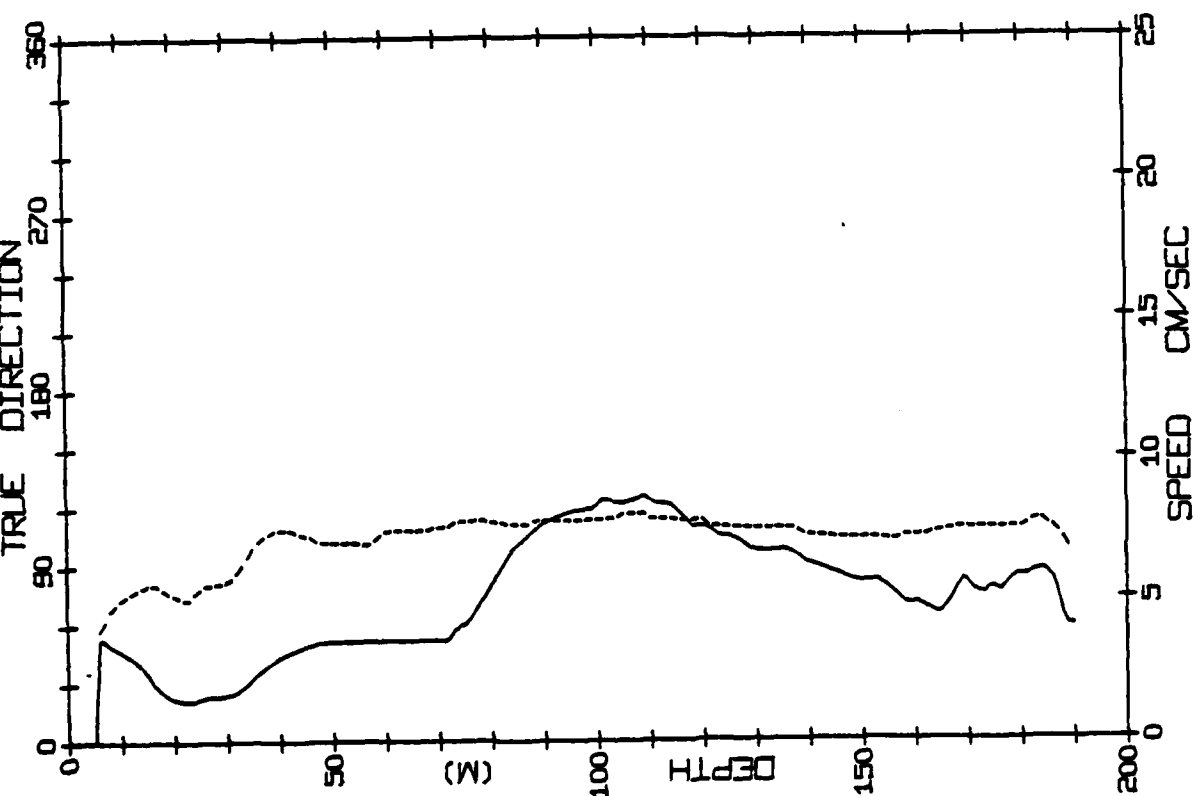
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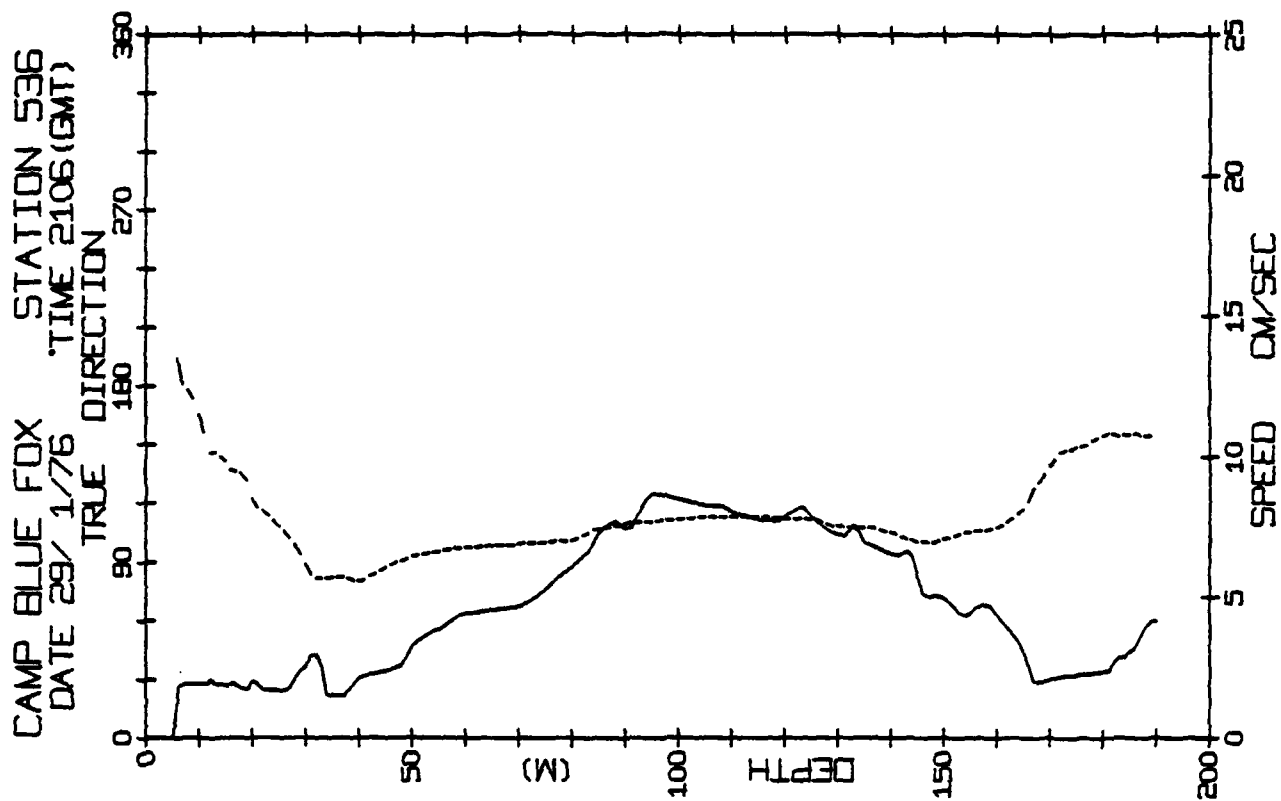
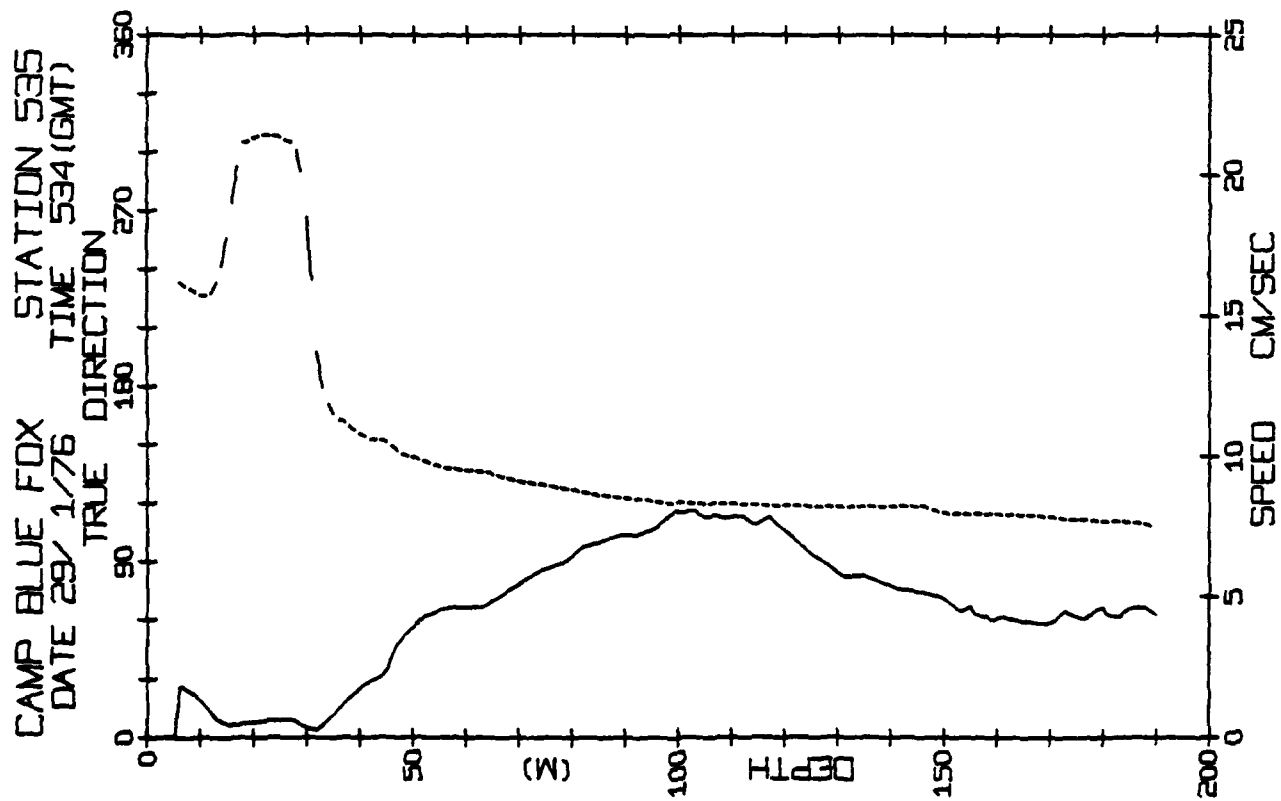


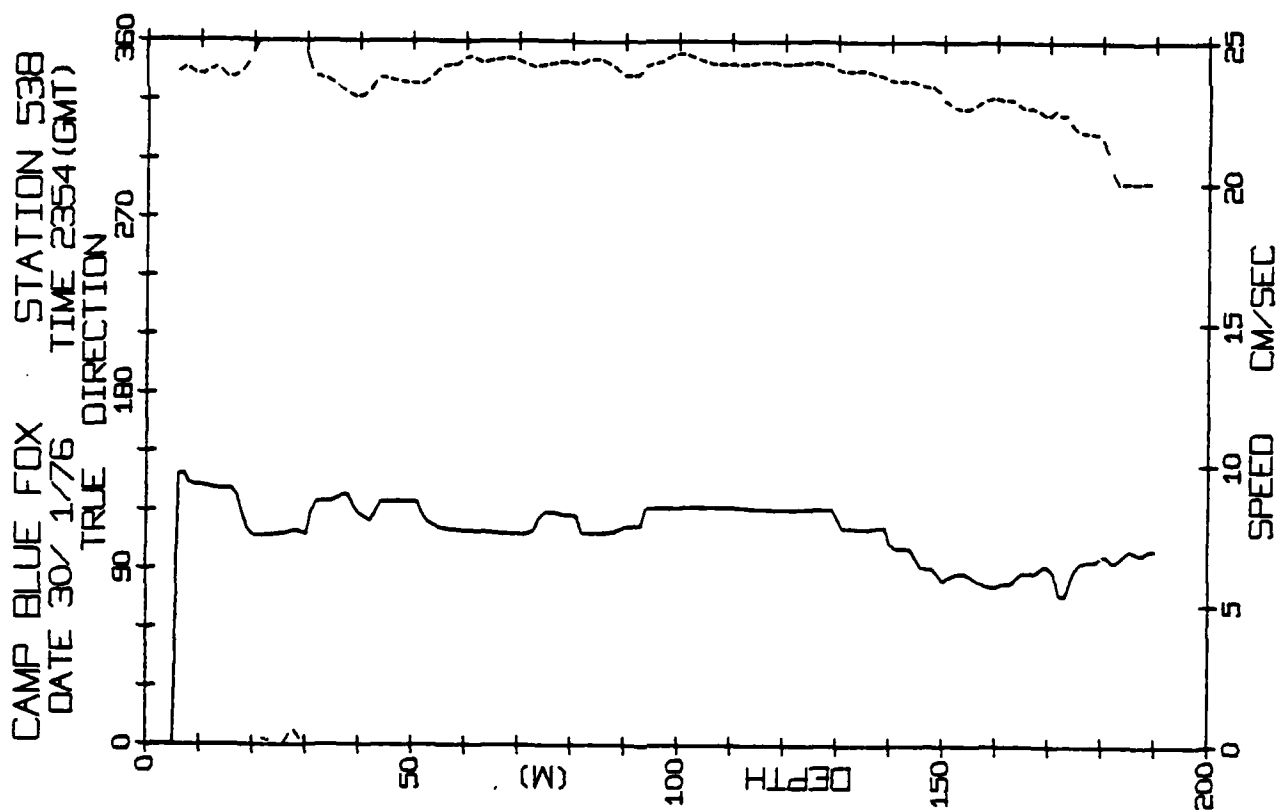
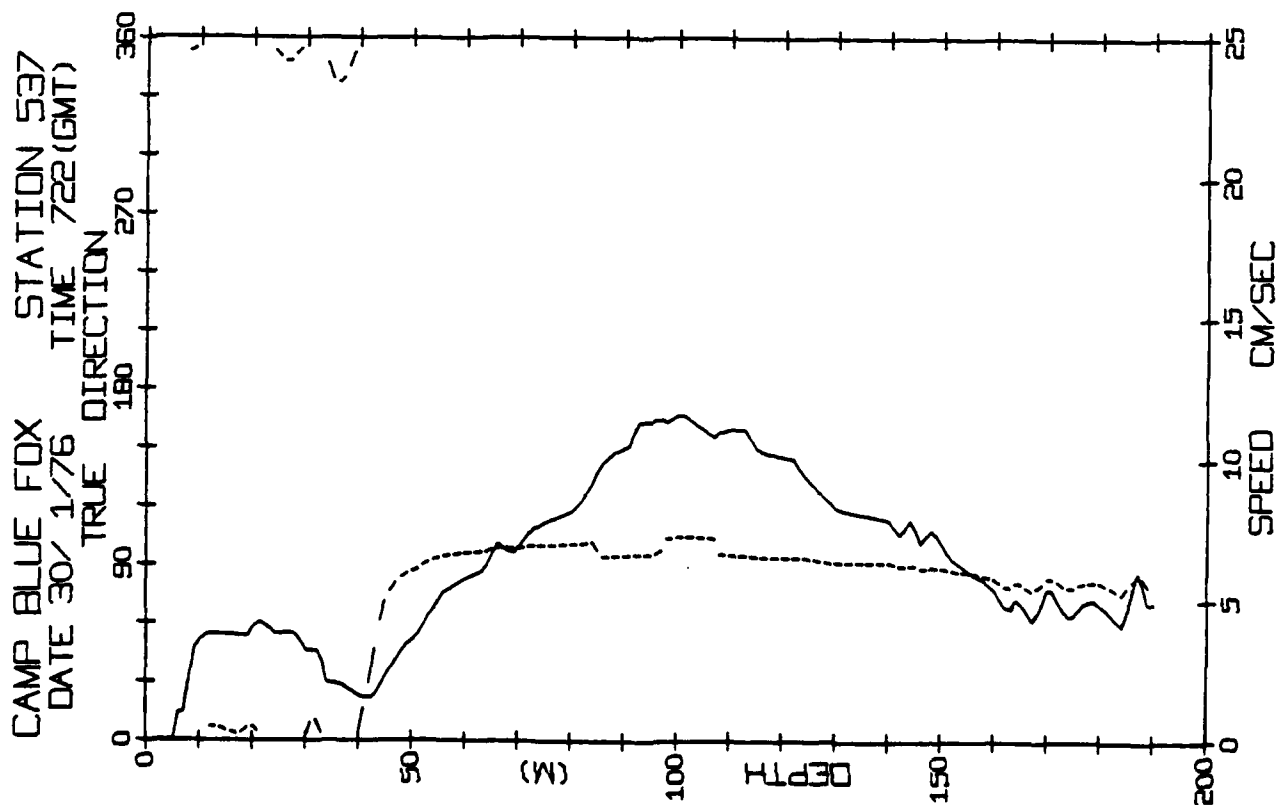
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 TRUE DIRECTION



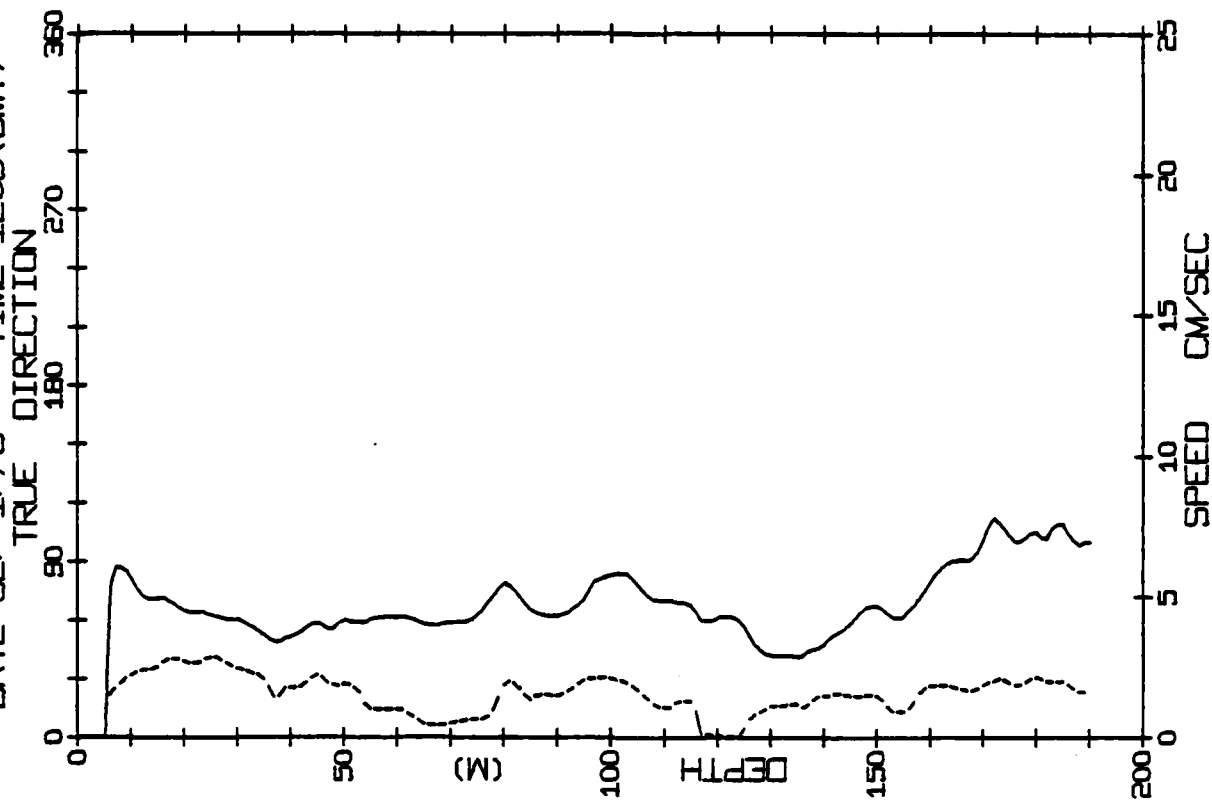
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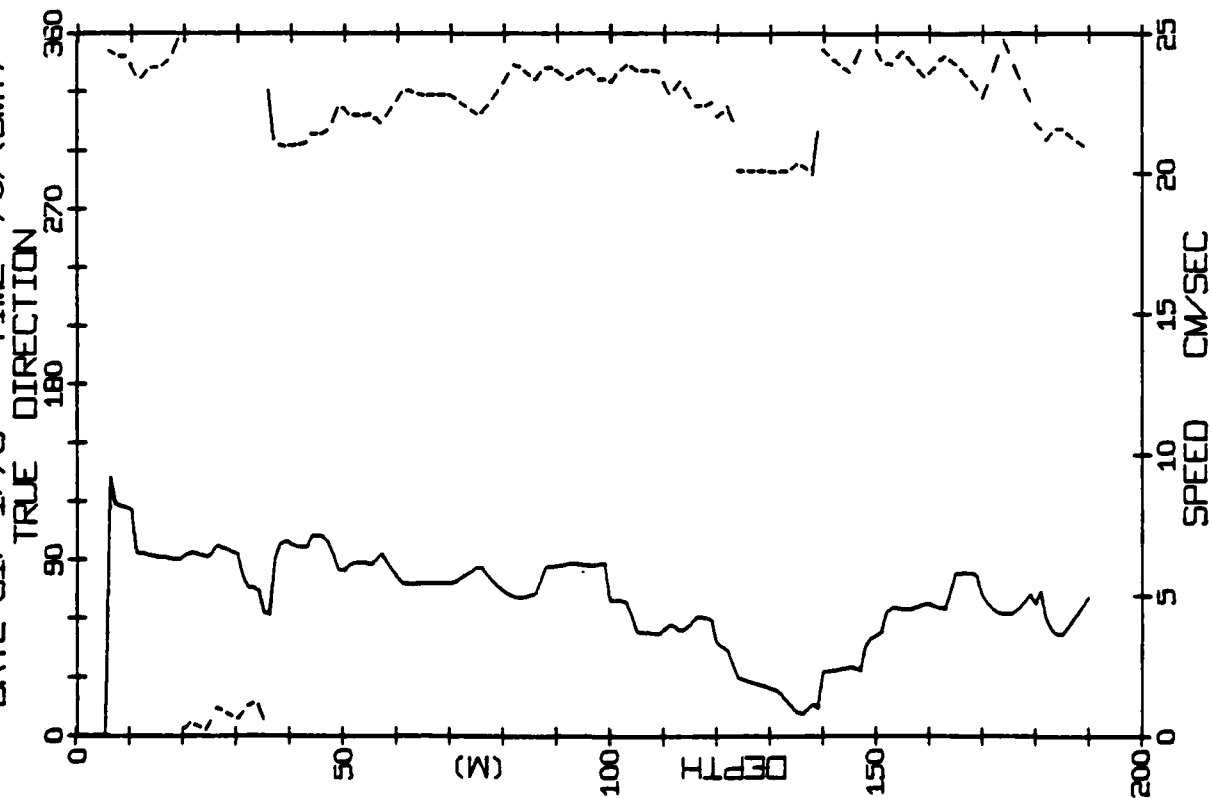




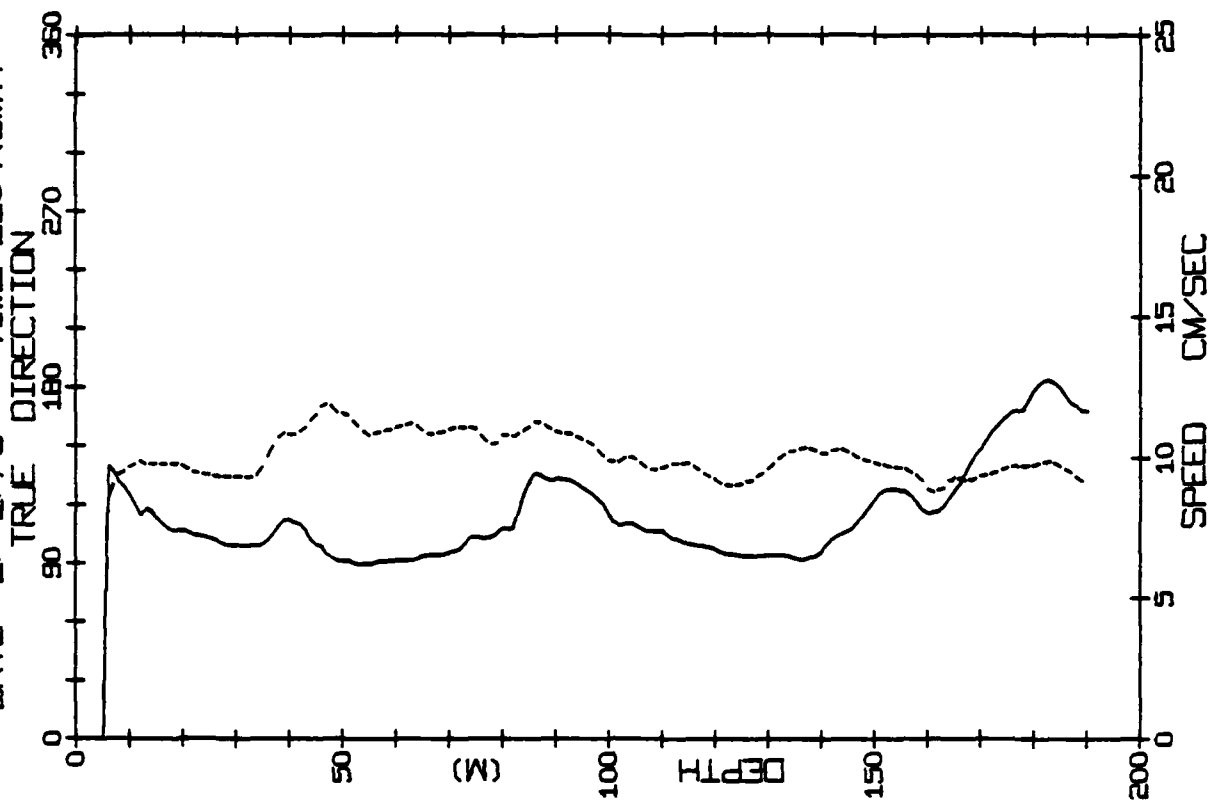
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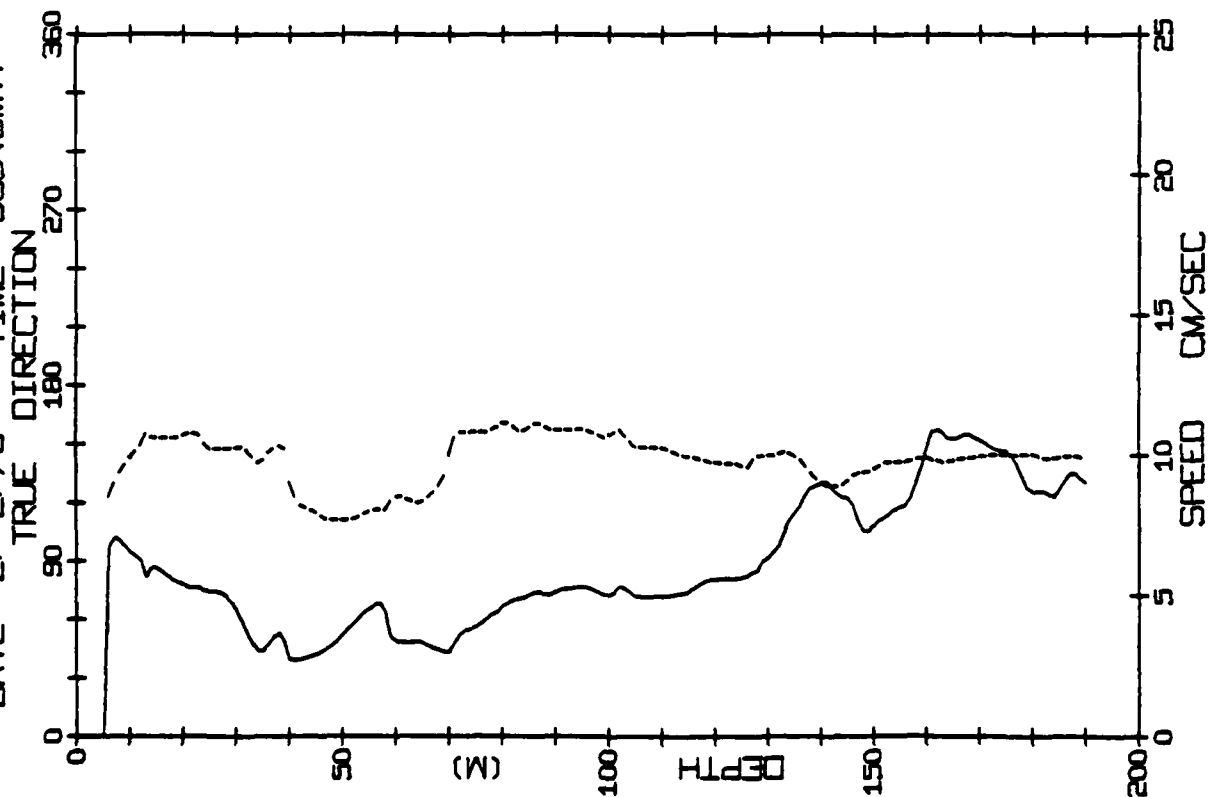
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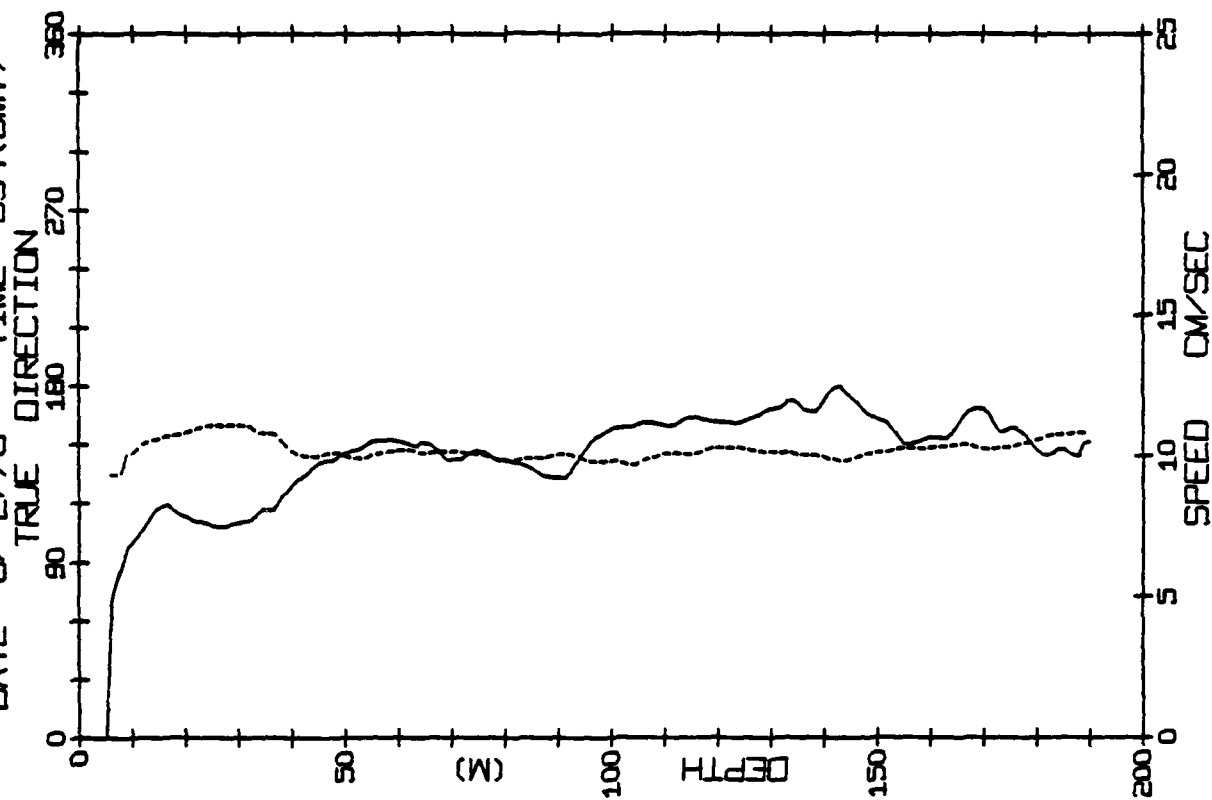
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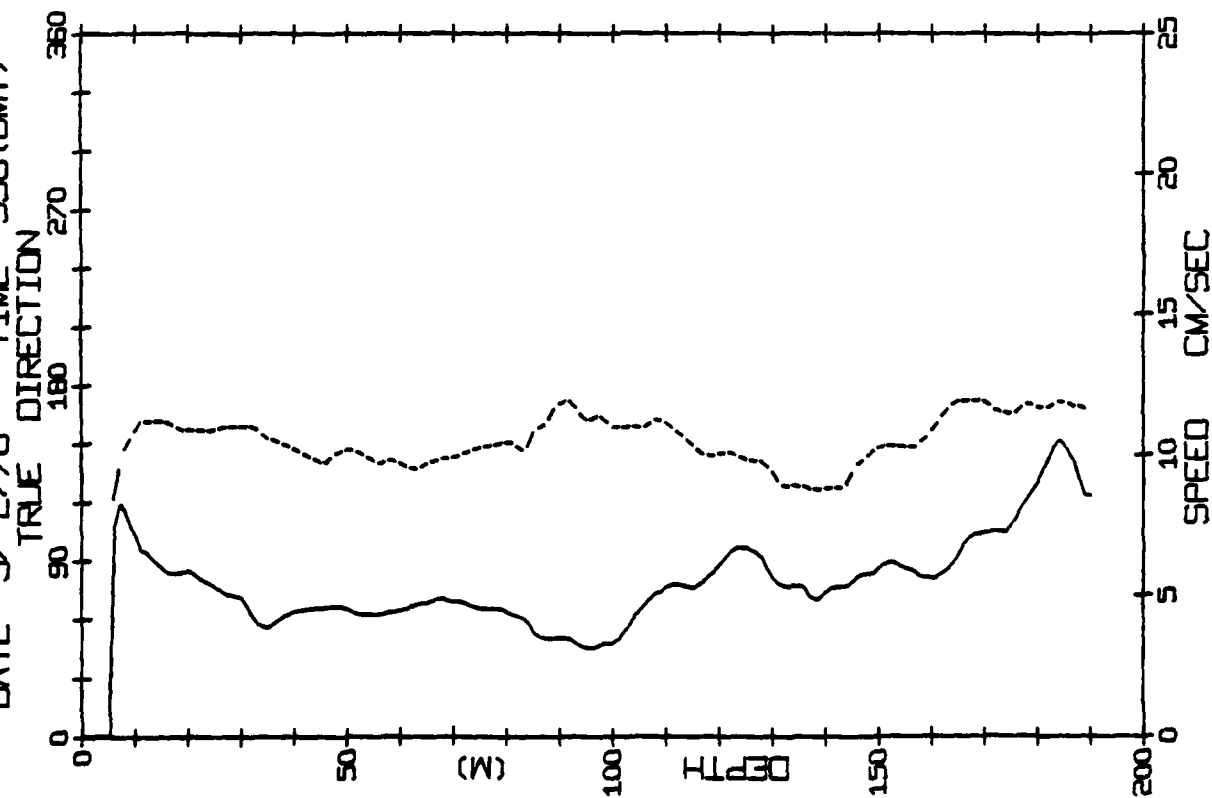
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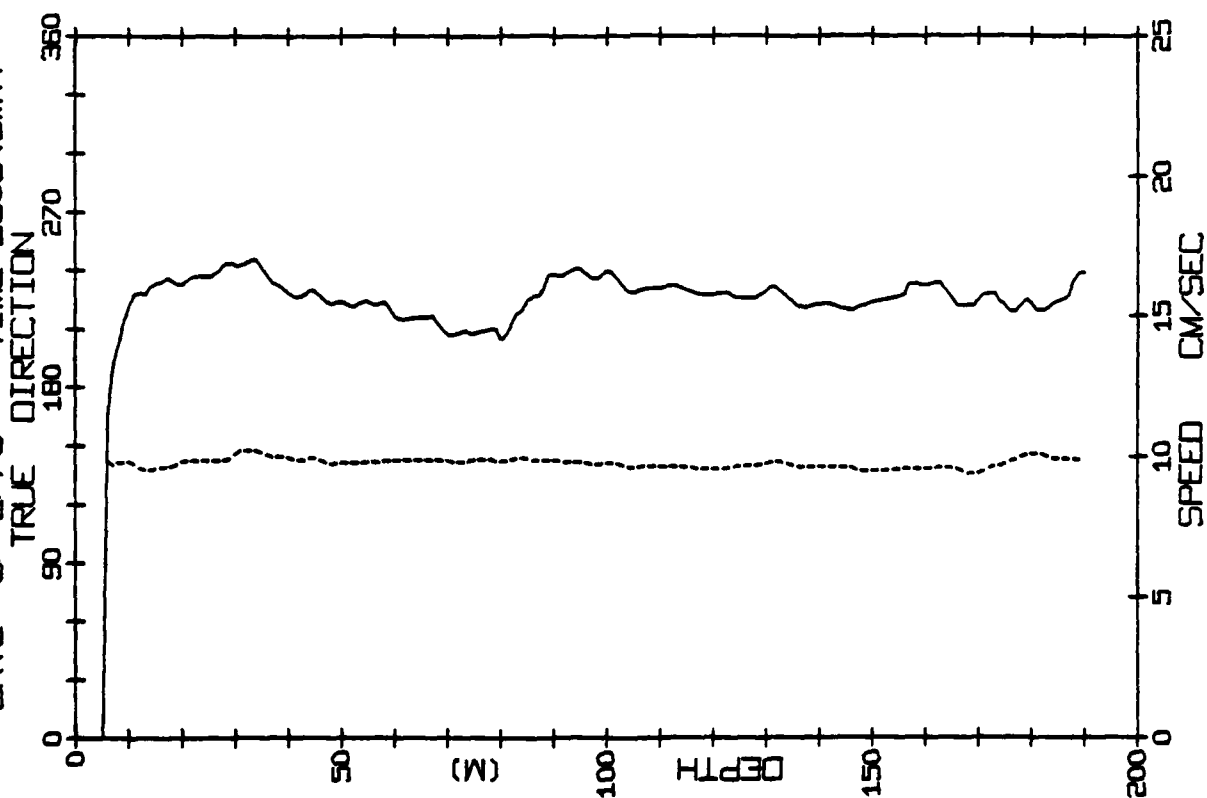
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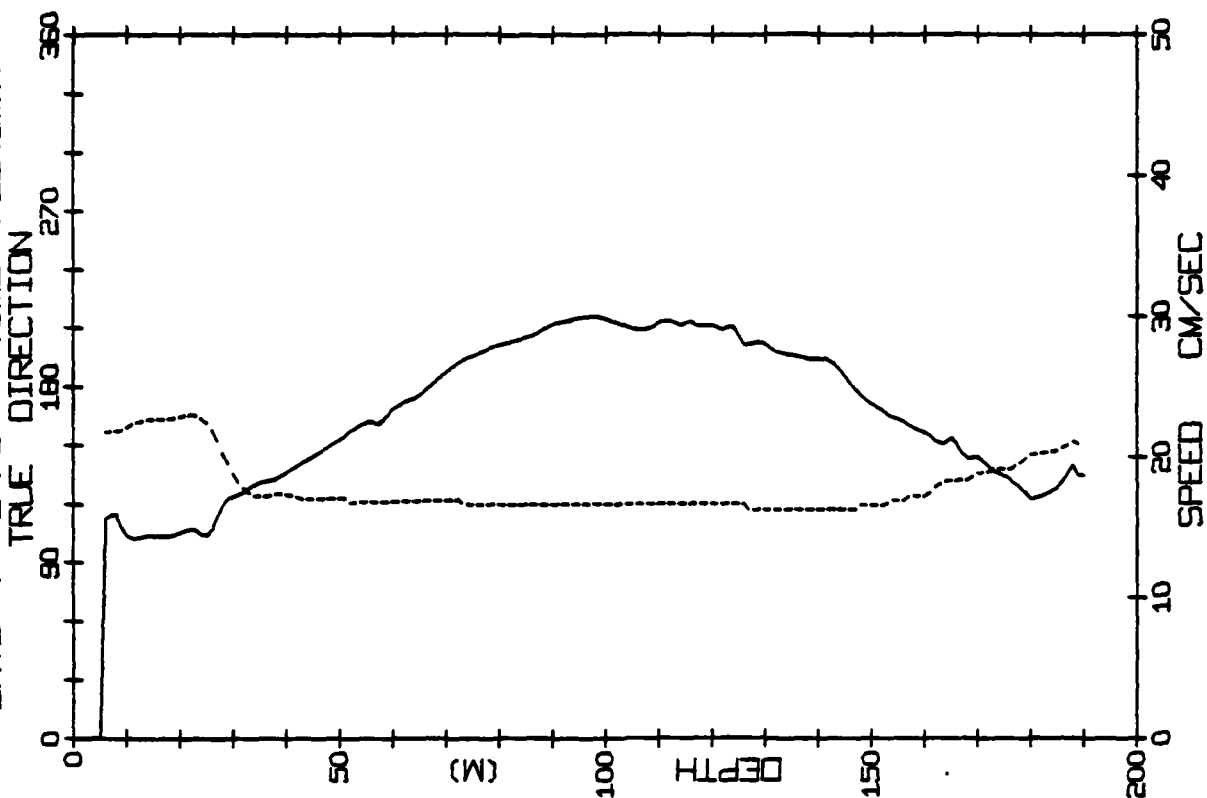
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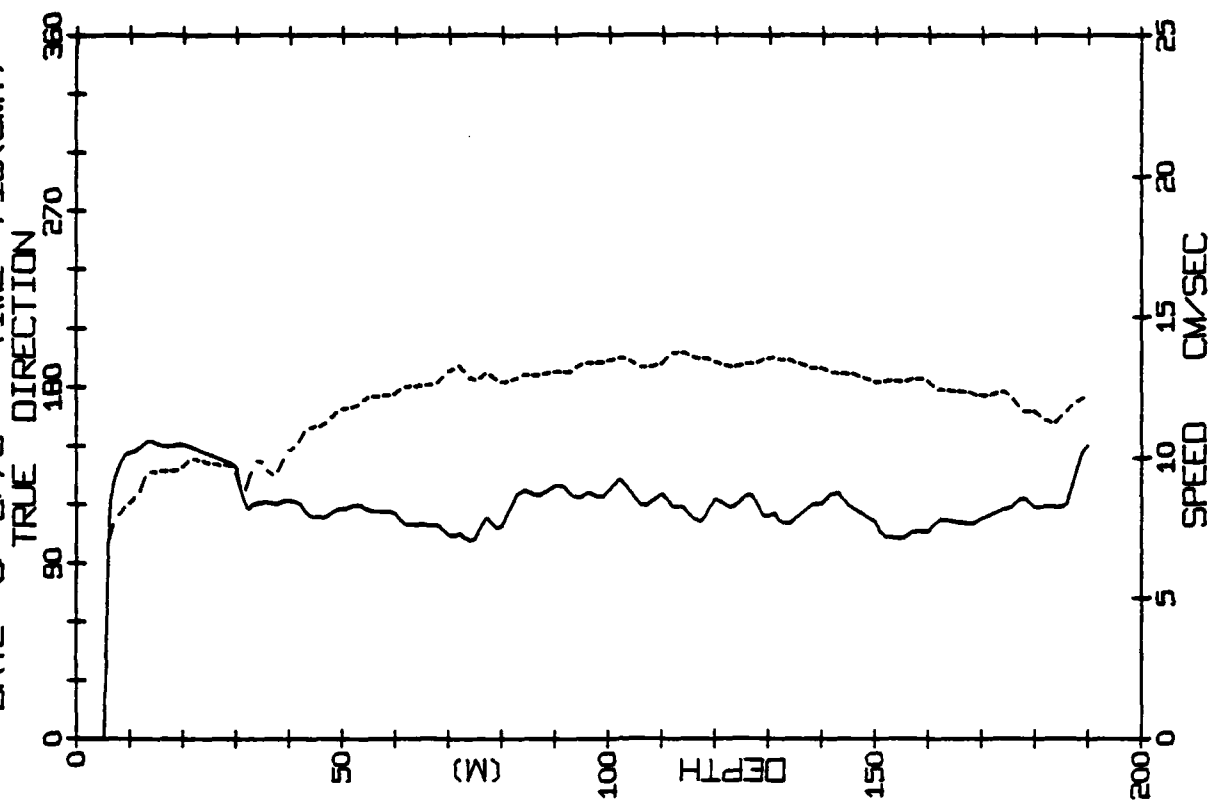
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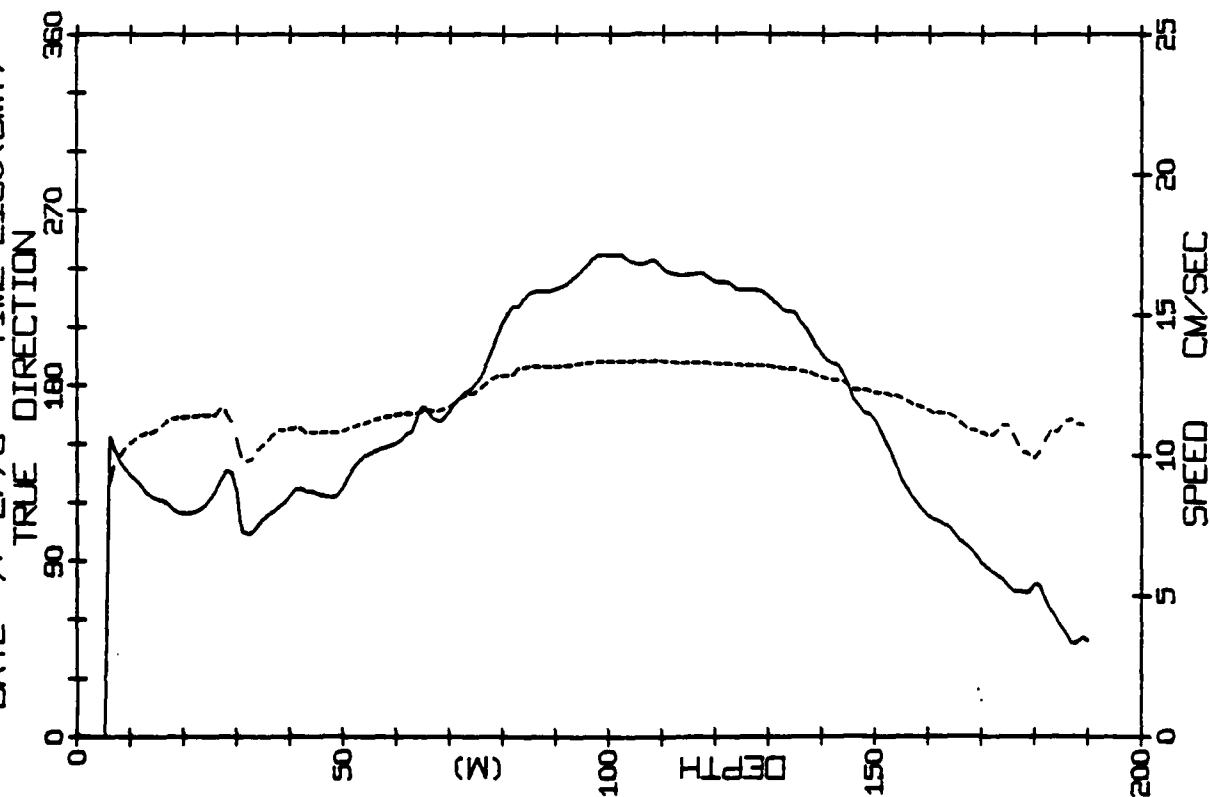
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DATE 7/2/76 TIME 711(GMT)



CAMP BLUE FOX STATION 555
DATE 8/2/76 TIME 718(GMT)

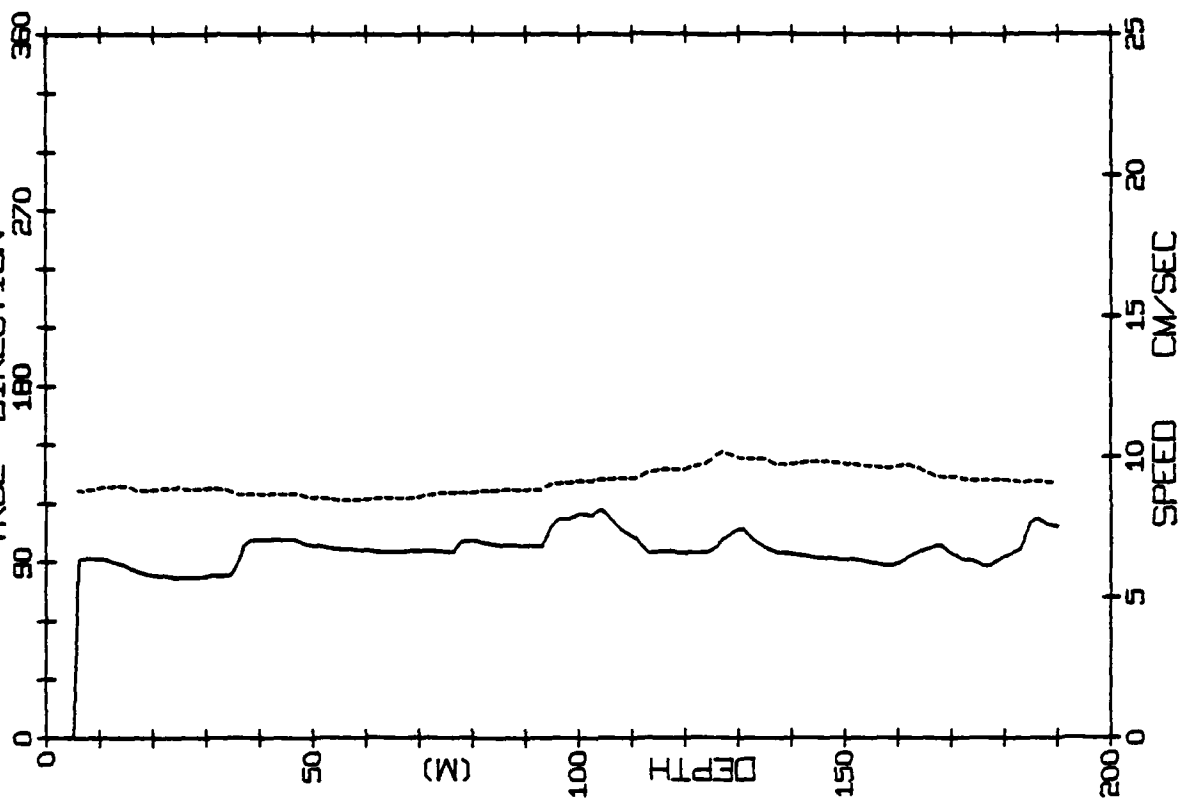


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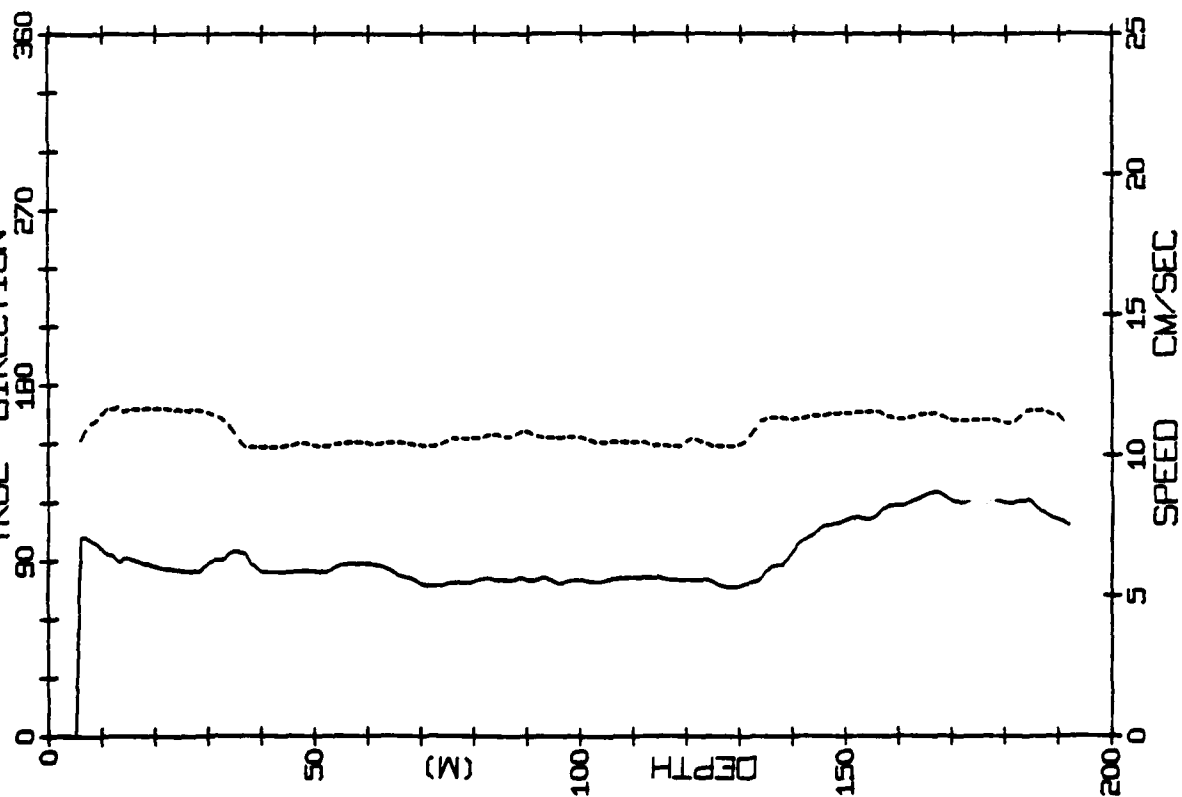
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DATE 9/2/76 TIME 624(GMT)

TRUE DIRECTION

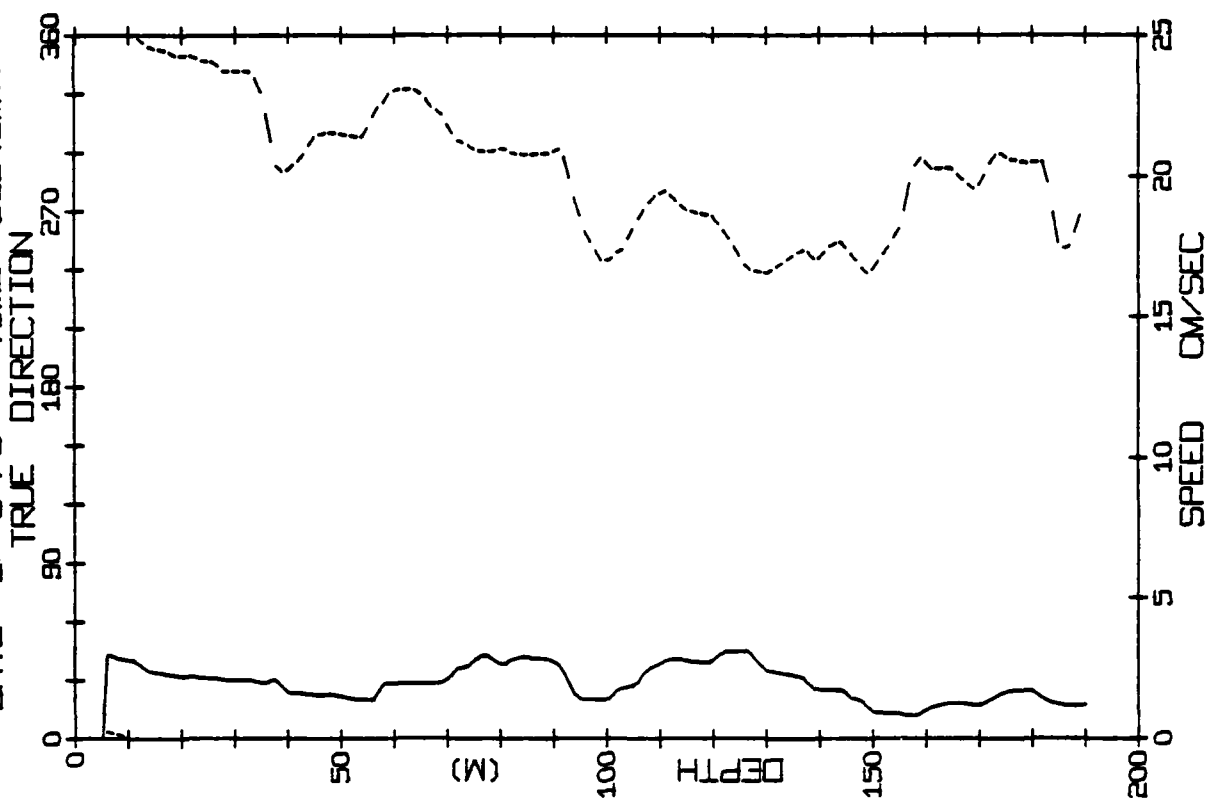


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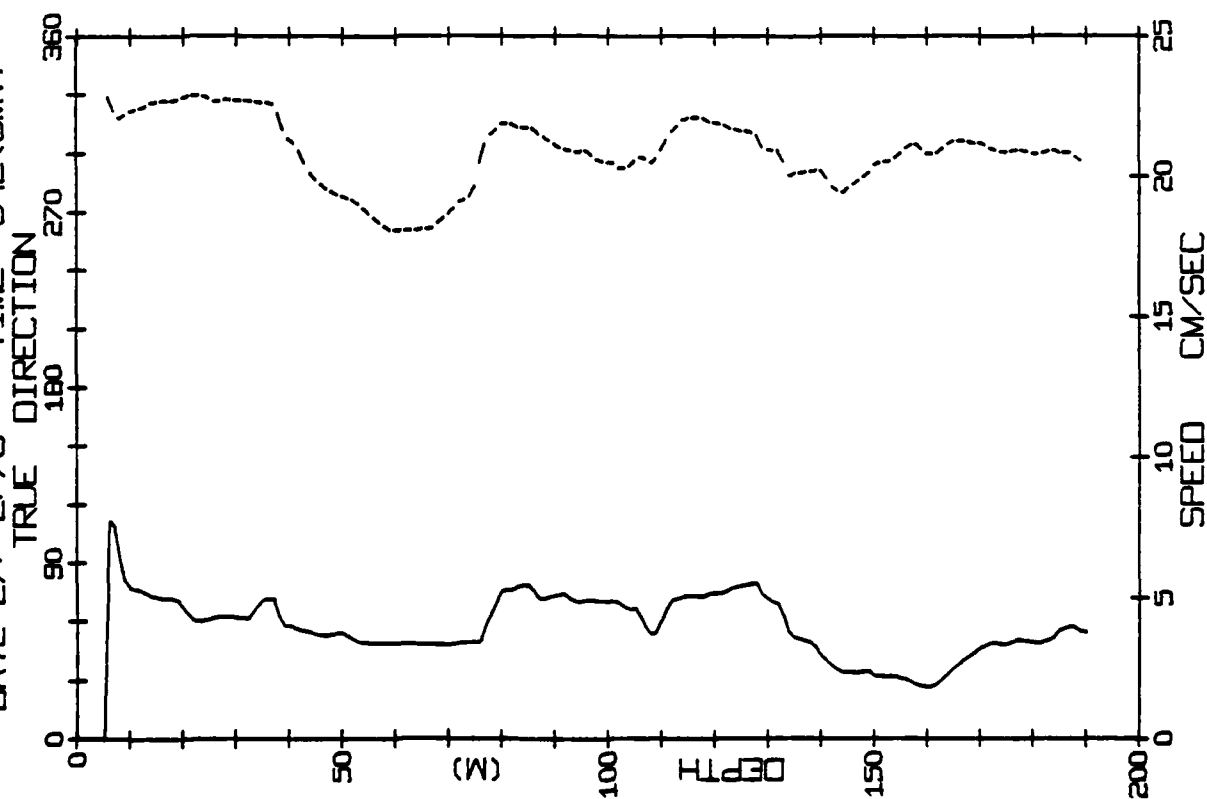
TRUE DIRECTION



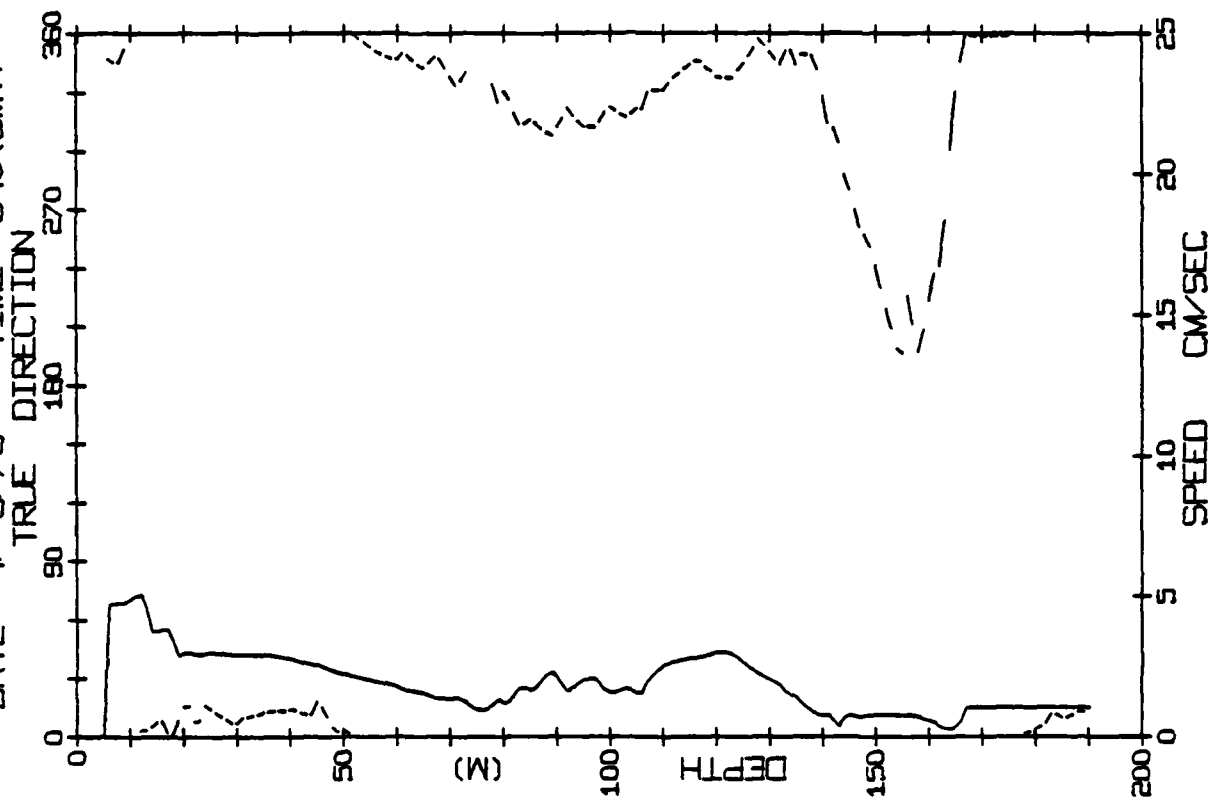
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DATE 1/ 3/76 TIME 535(GMT)



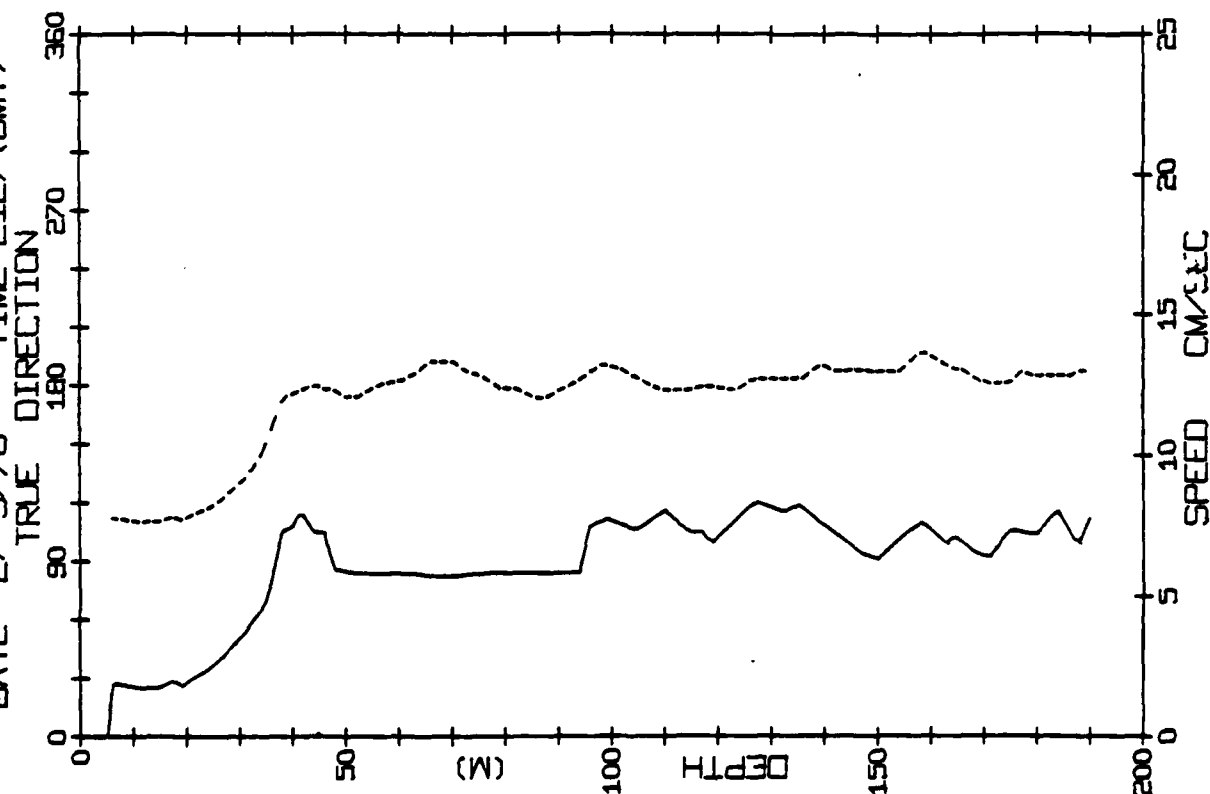
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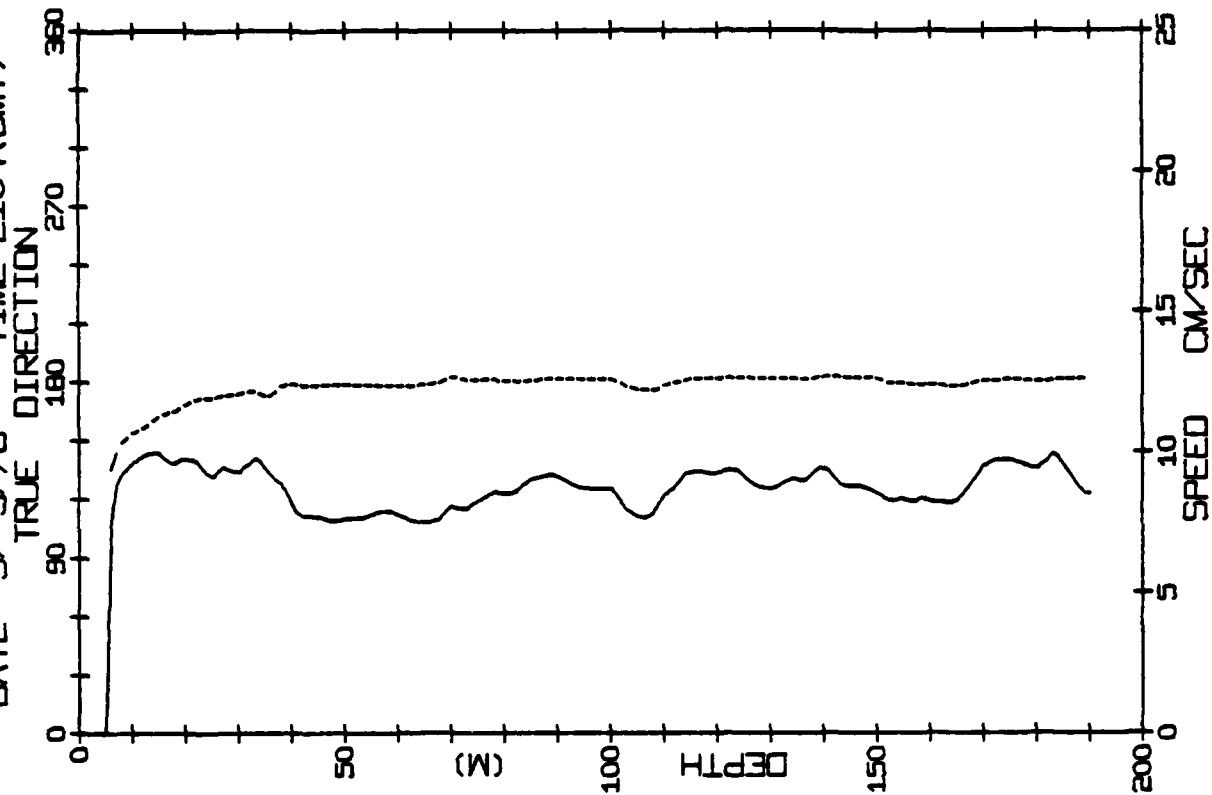
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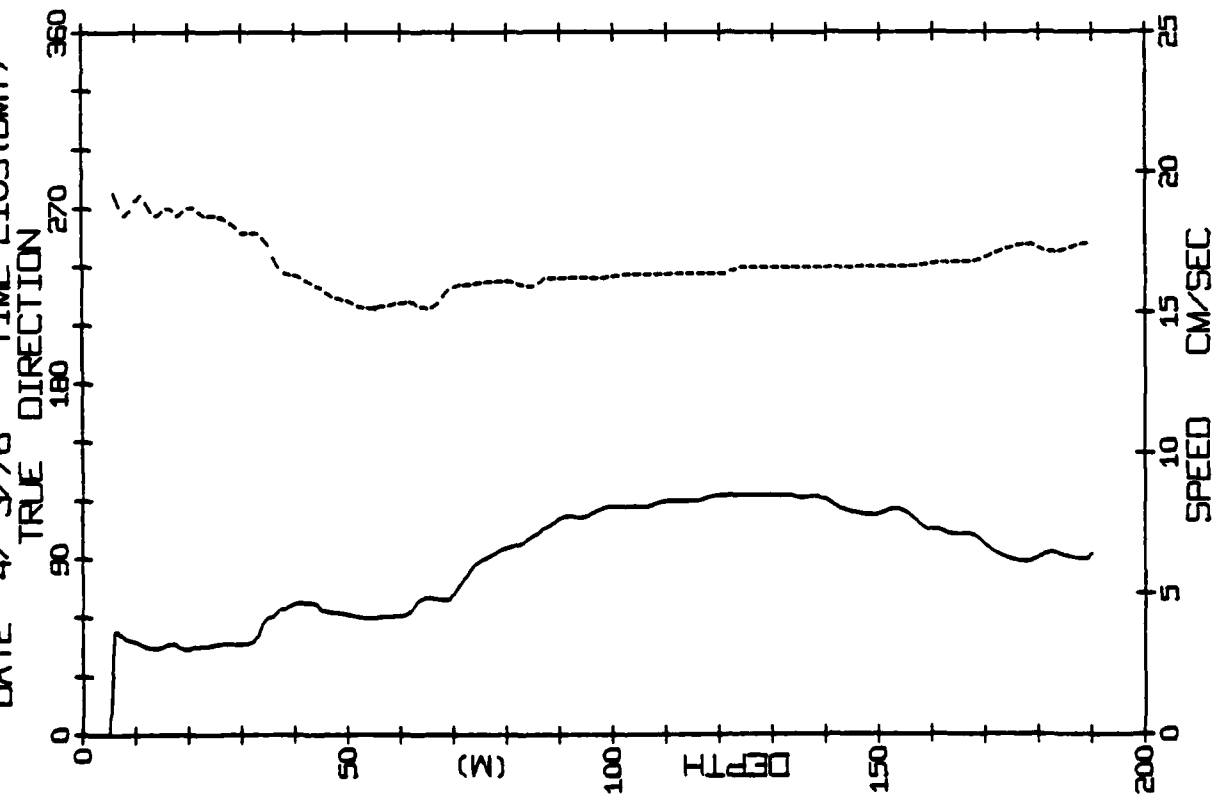
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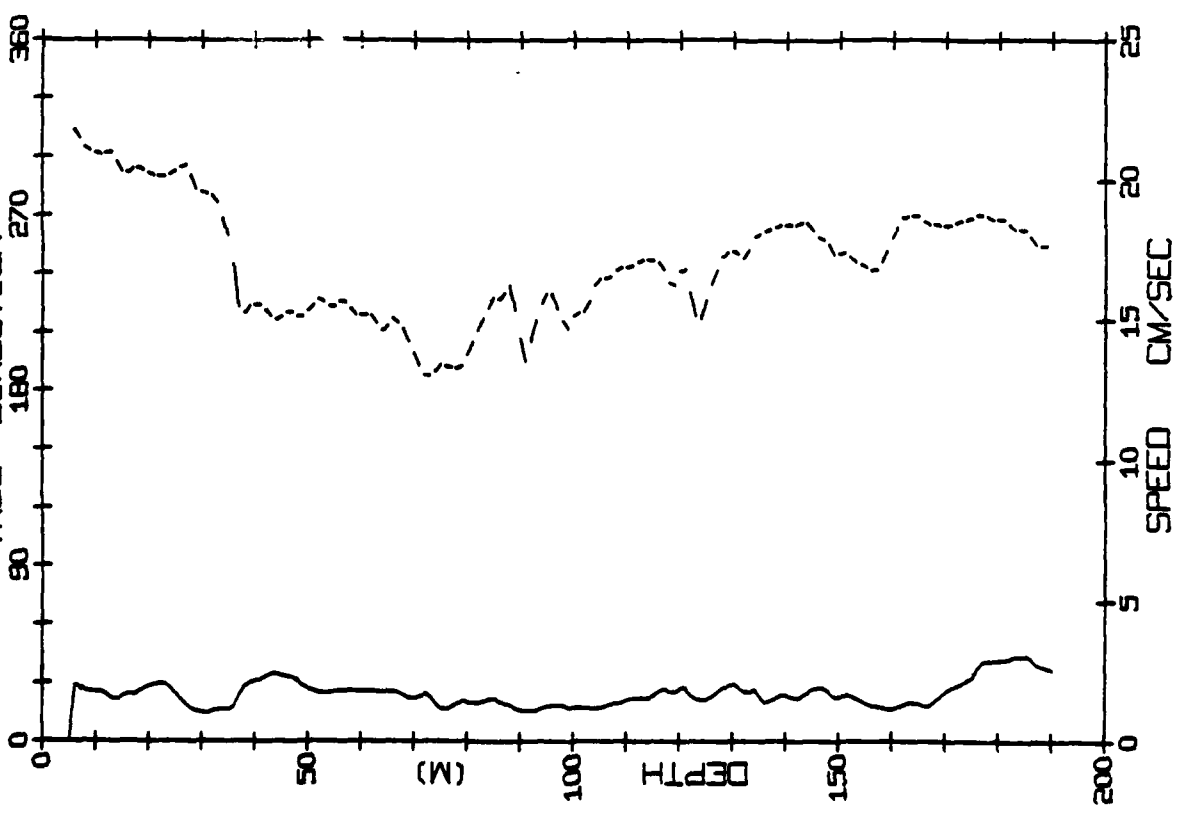
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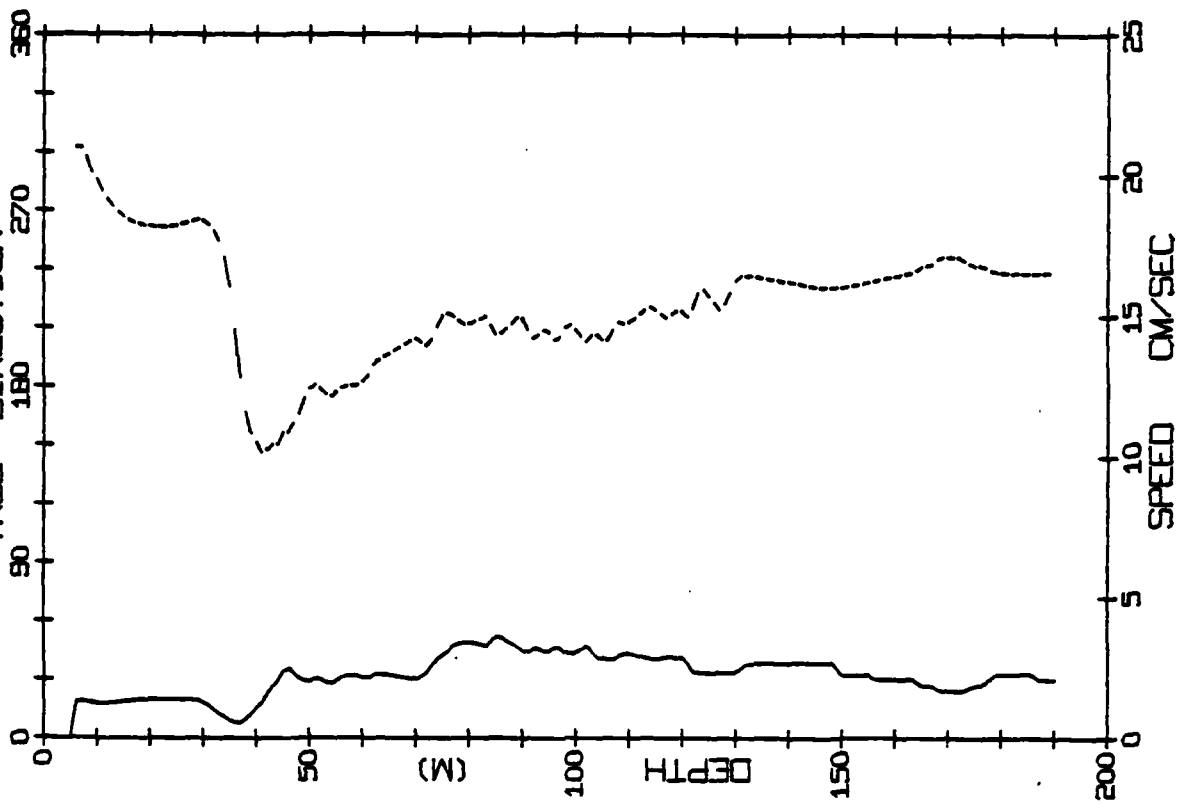
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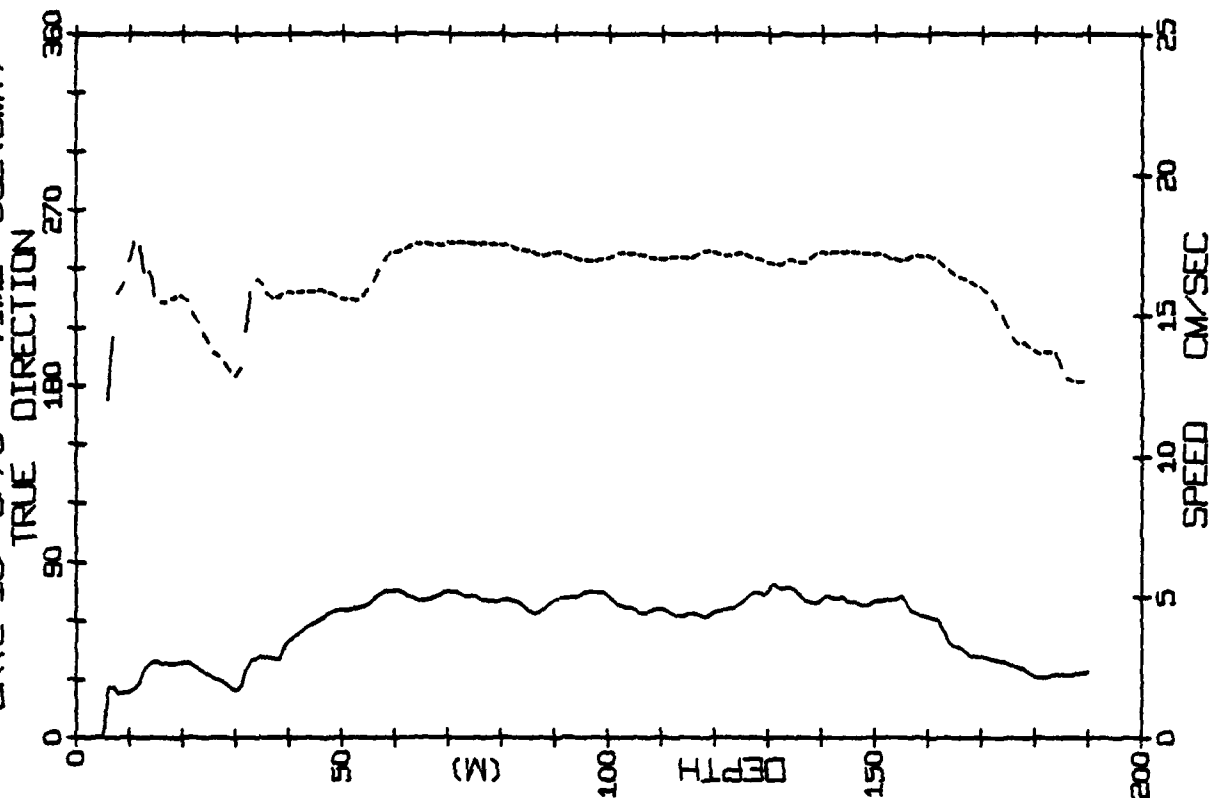
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DATE 7/3/76 TIME 2110(GMT)
TRUE DIRECTION



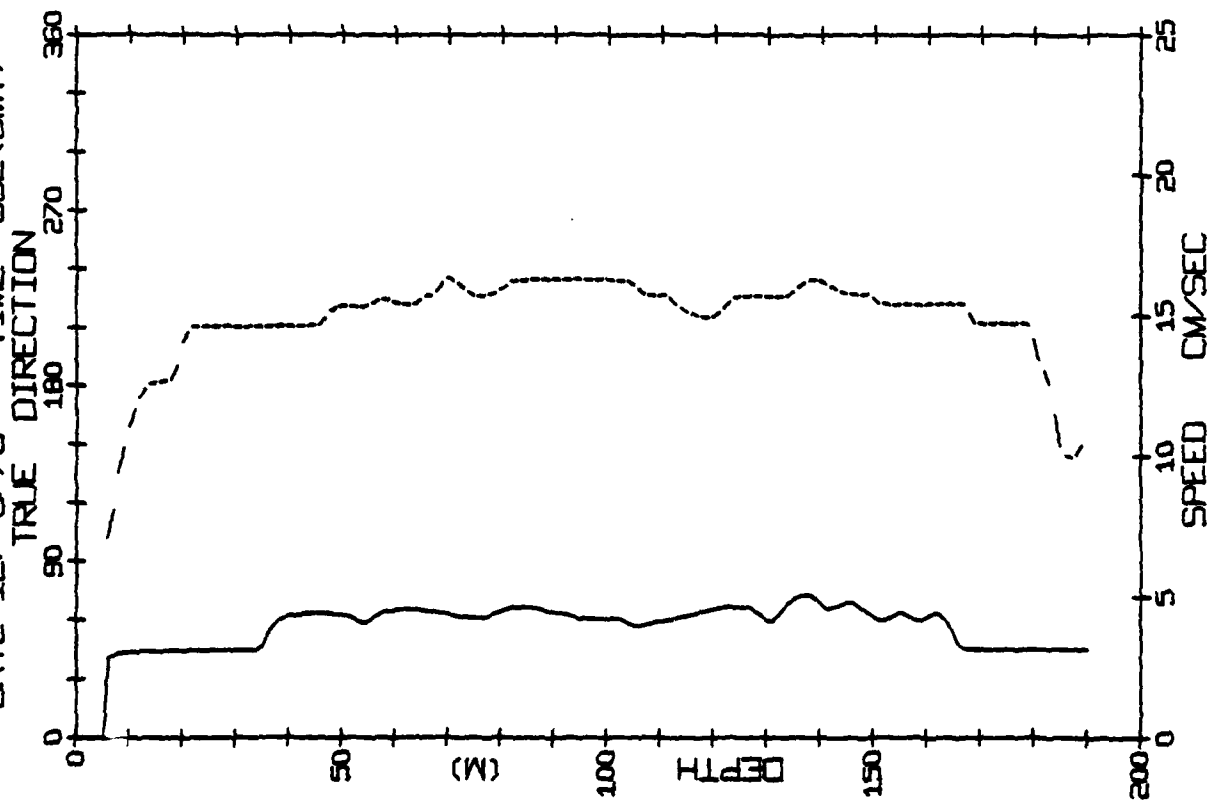
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TRUE DIRECTION



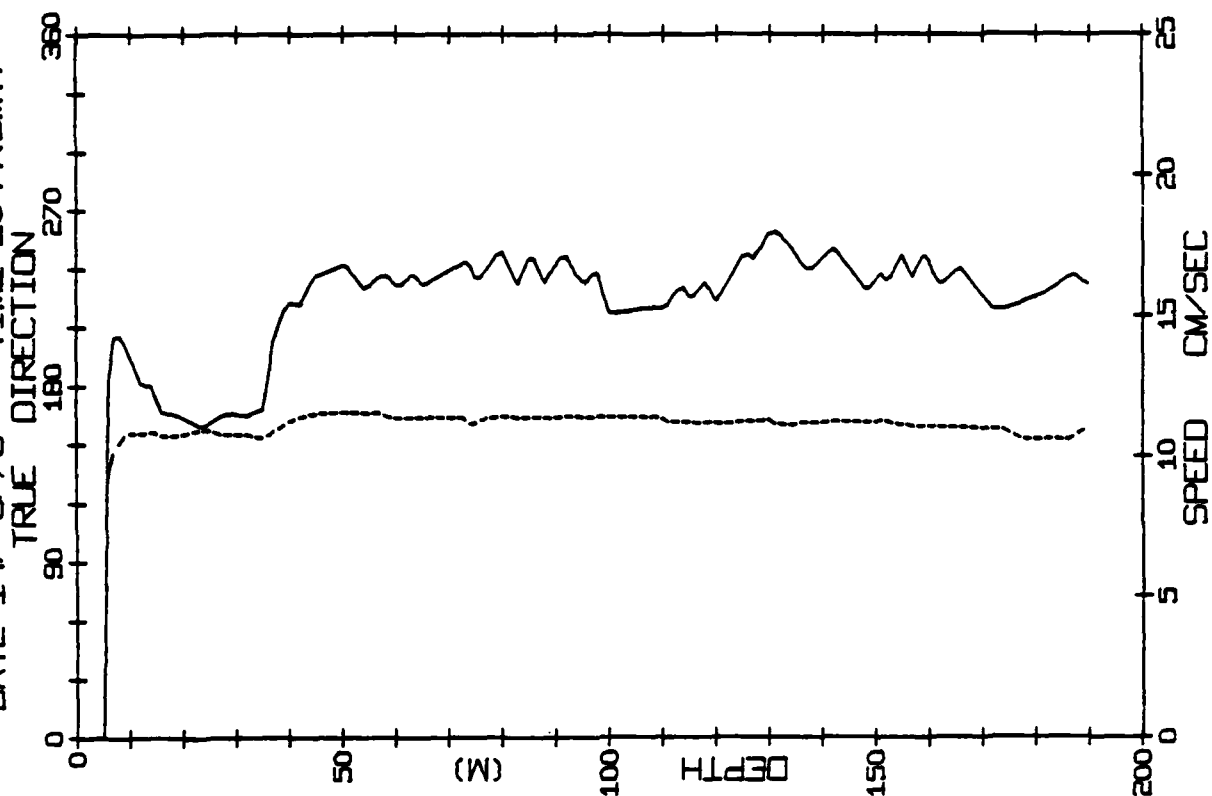
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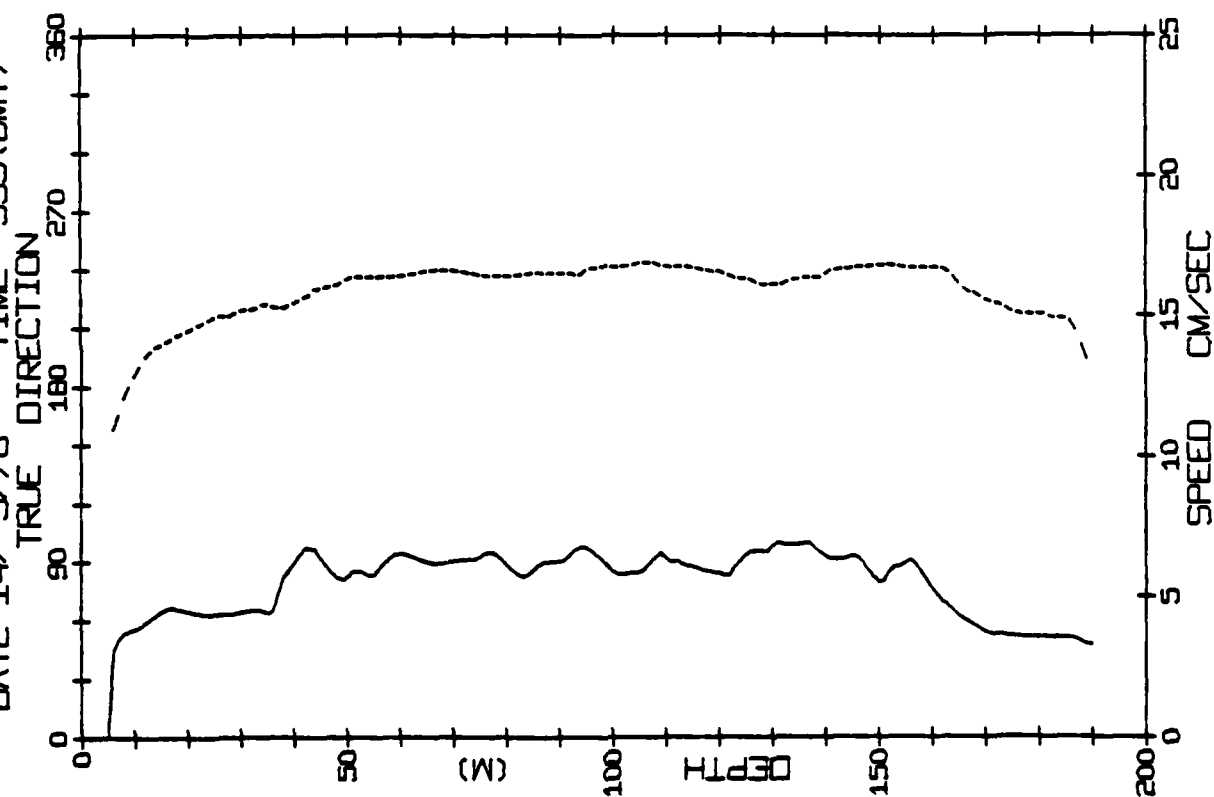
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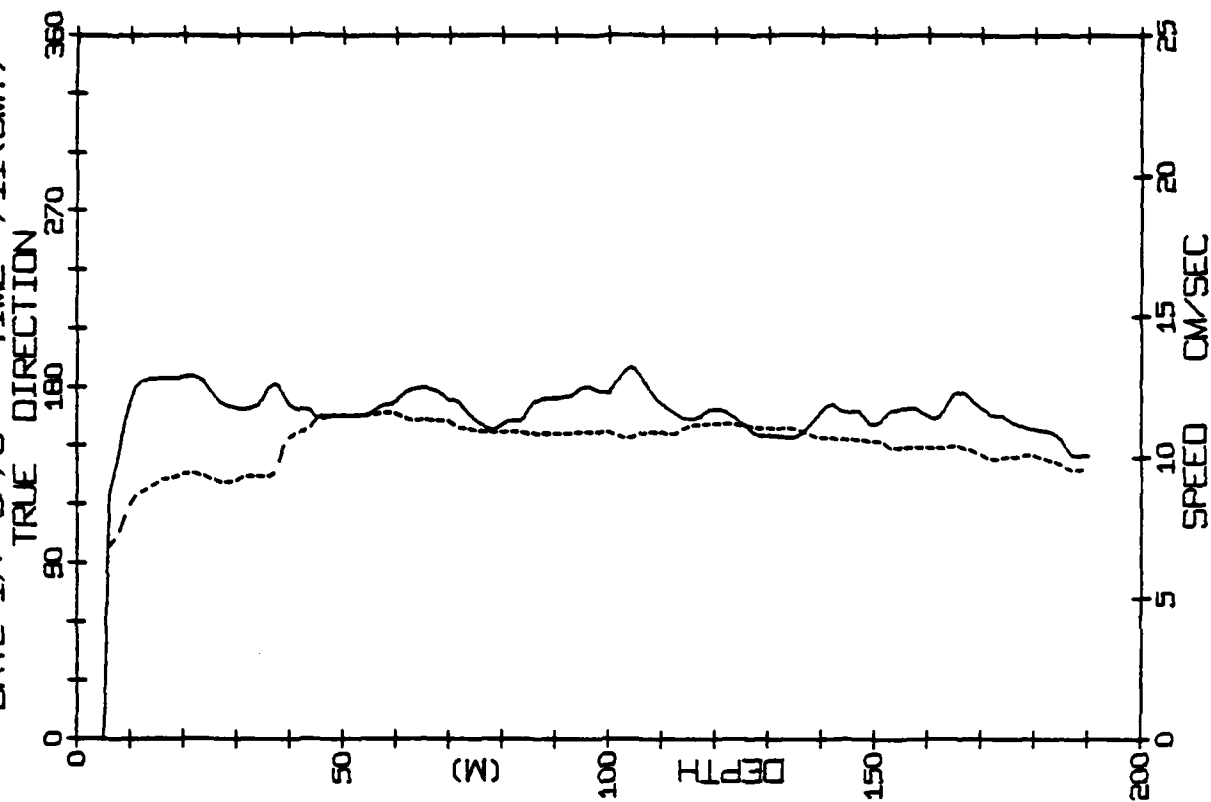
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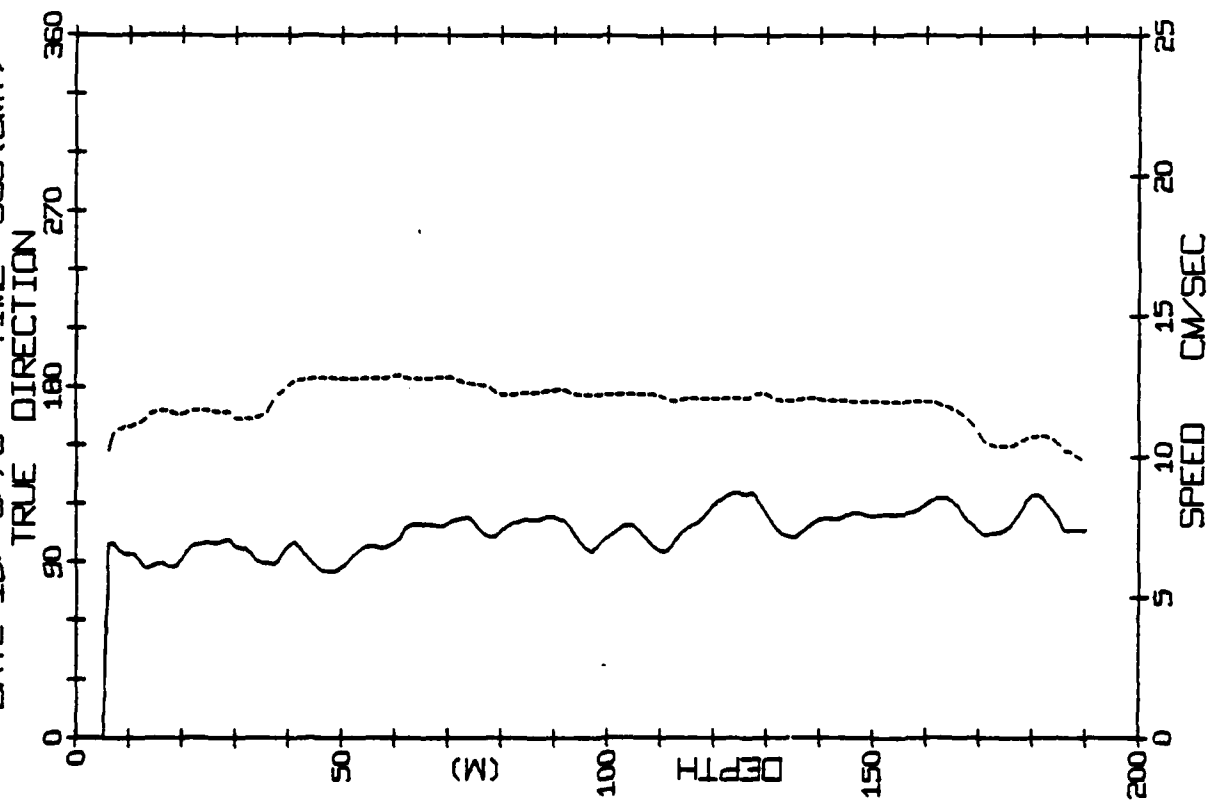
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DATE 14/ 3/76 TIME 535(GMT)



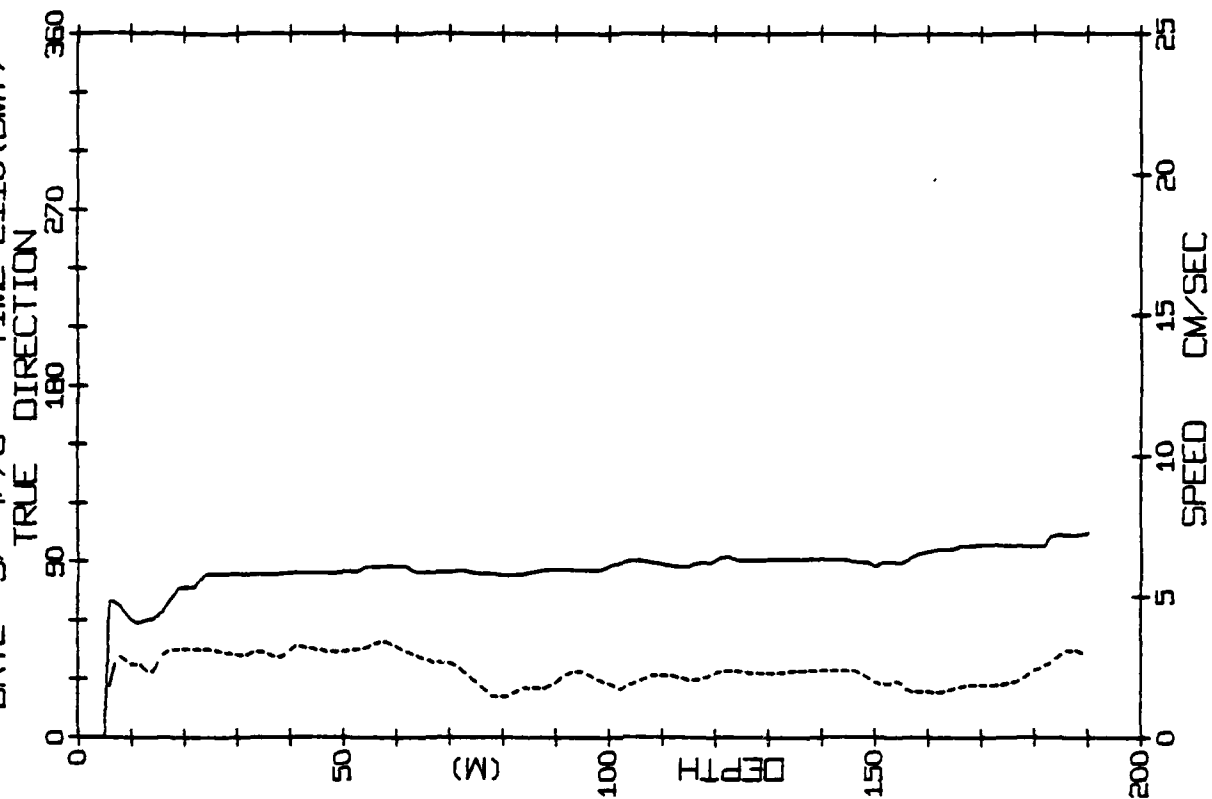
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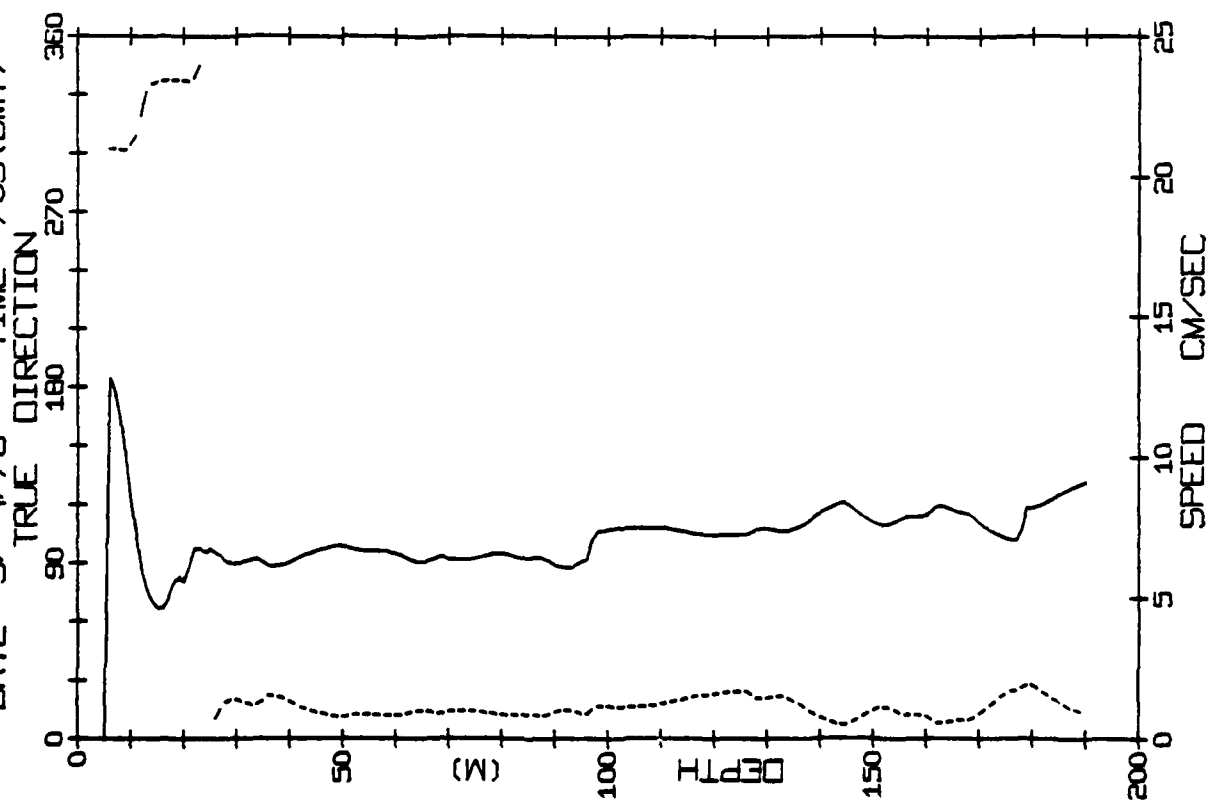
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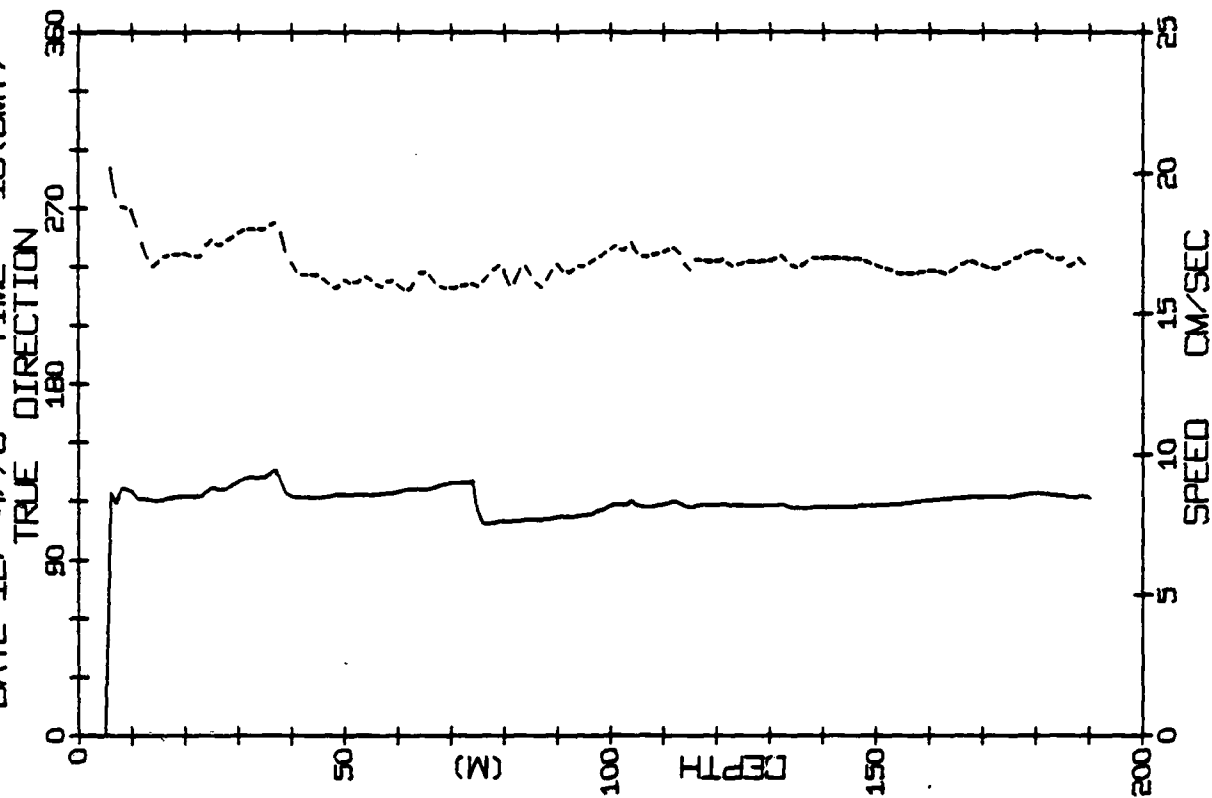
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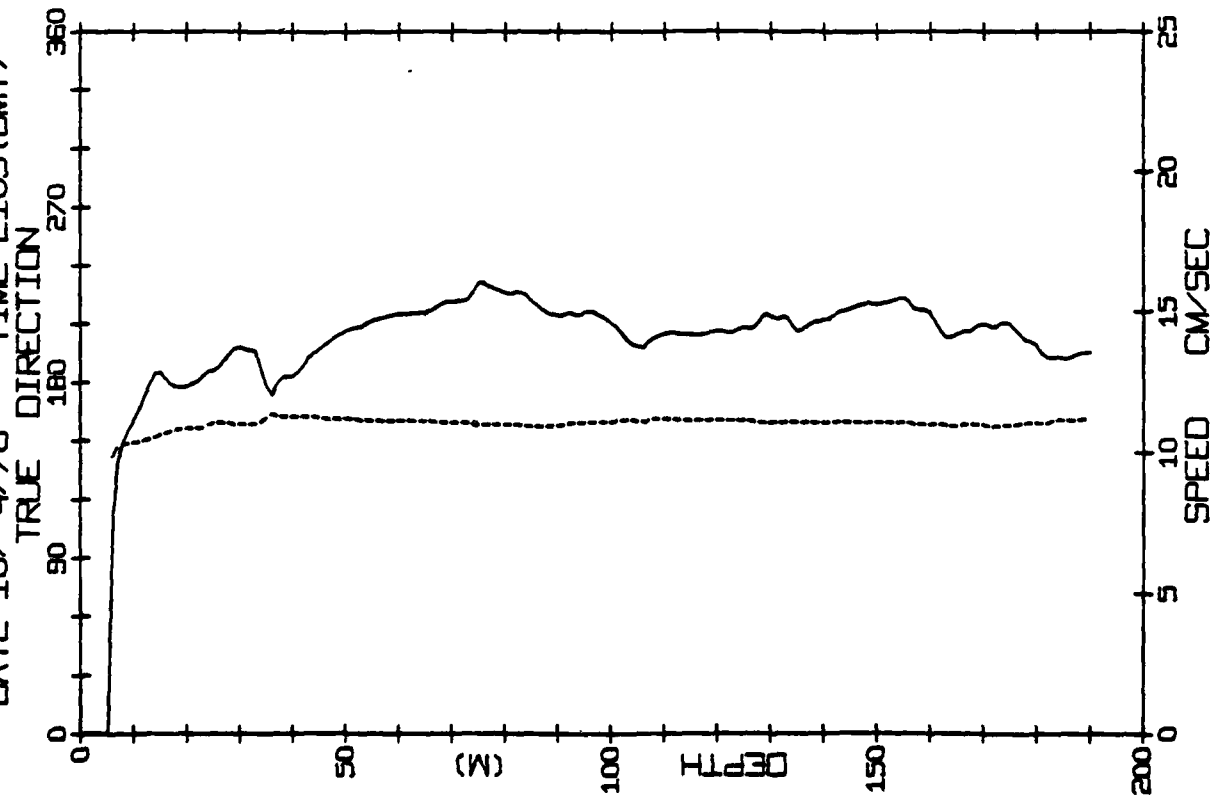
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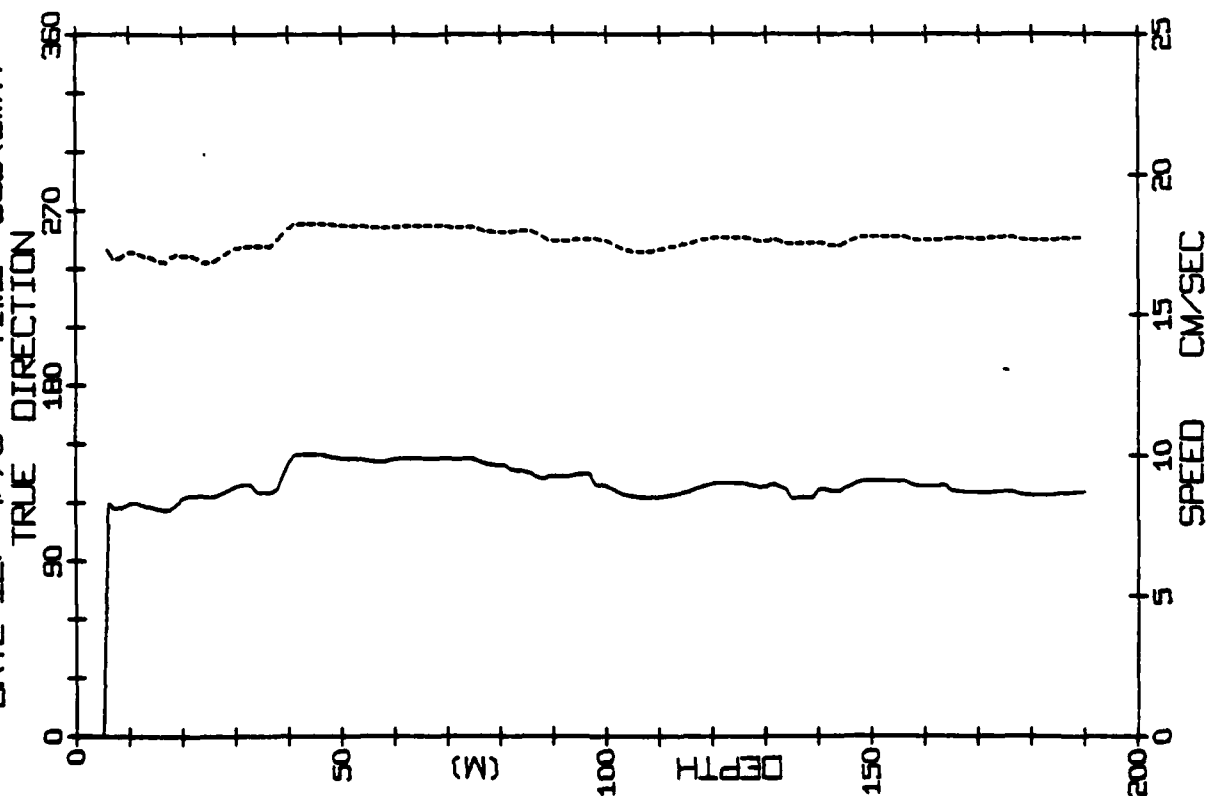
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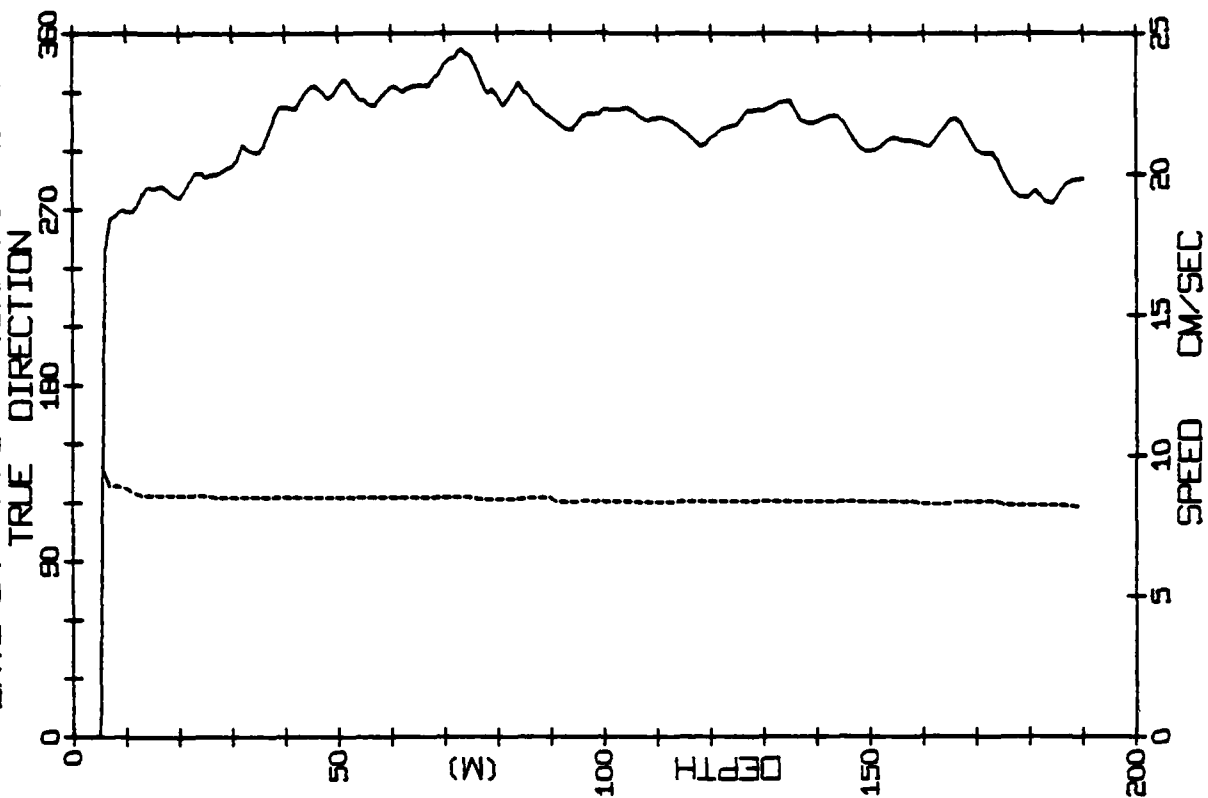
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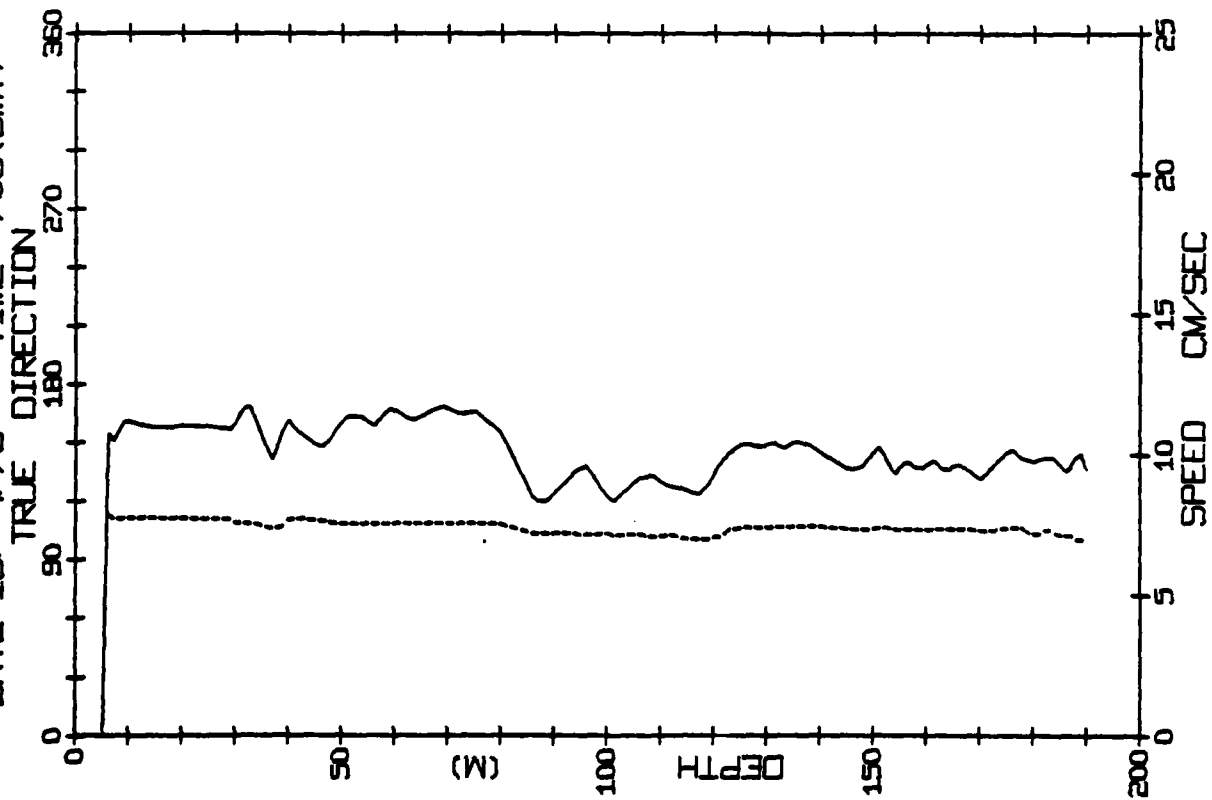
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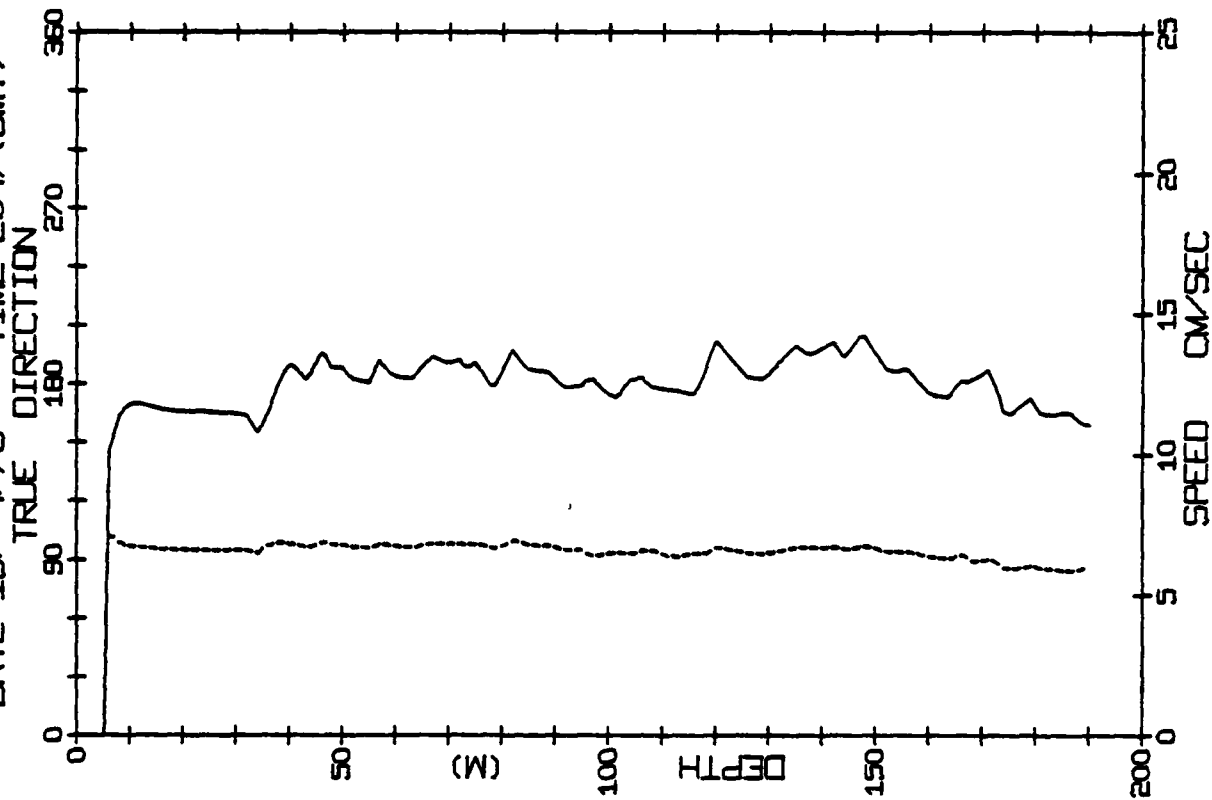
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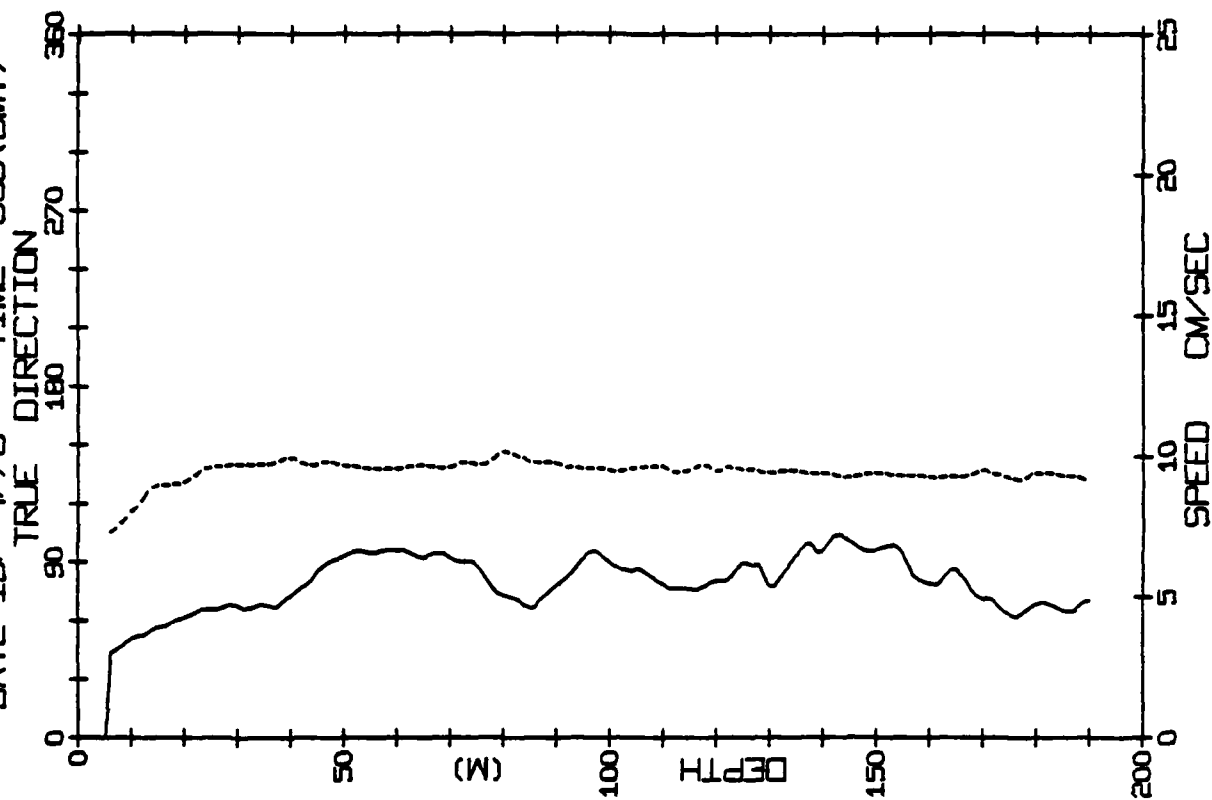
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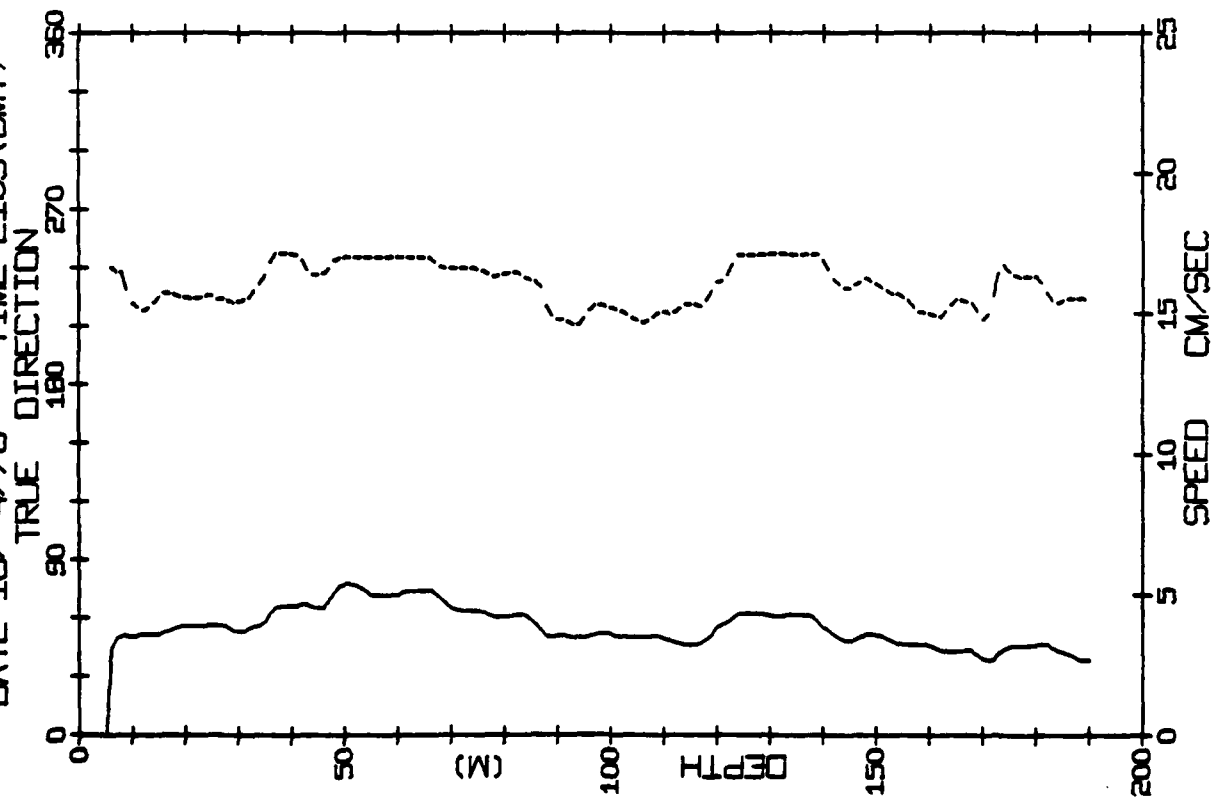
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DATE 15/ 4/76 TIME 2047(GMT)



CAMP BLUE FOX STATION 697
DATE 19/ 4/76 TIME 535 (GMT)



CAMP BLUE FOX STATION 696
DATE 18/ 4/76 TIME 2105 (GMT)



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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) AIDJEX, ocean Currents, Arctic Ocean mesoscale eddies, Ekman Drift		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The oceanographic program of the 1975-1976 ARCTIC ICE DYNAMICS JOINT EXPERIMENT (AIDJEX) was designed to investigate the Arctic Ocean on space scales of 100 kilometers in the horizontal and hundreds of meters in the vertical. This was accomplished with oceanographic observations from a triangular array of three small- er manned satellite camps with a centrally located larger main camp. The radio call signs of the satellite camps were Caribou,		

Blue Fox and Snowbird; the main camp being designated Big Bear.

Profiles of relative current speed and direction were measured twice each day between the surface and 200 meters at each of the four camps. A profiling current meter (PCM) with speed, direction and depth sensors was lowered and retrieved with a multi-conductor cable at a slow rate of 5 meters per minute. Sensor signals were transmitted by cable to be recorded graphically and digitally at the surface. Digital recording of the data at a slow rate of 1 scan per half minute along with a low signal to noise ratio made it preferable to manually digitize the analog charts to preserve as much information as possible.

The final data set, consisting of absolute velocity profiles of speed and direction, was obtained by the vector addition of the relative PCM profiles with the interpolated ice velocity based on precise satellite navigation at the time of the observation. Data reduction problems included a hysteresis effect between up and down traces due to cable angle, directional spikes resulting from a rapid sensor package rotation, and spurious results when low velocities are added vectorially.

Relative speed between the ice and water in the upper mixed layer is often small, indicating that this layer closely follows the ice motion. Persistent large clockwise shears in relative current direction occur sometimes in the mixed layer, attaining up to 540 degrees of rotation. These are best seen in the relative velocity data. Upon the addition of the ice velocity vector, to produce absolute velocities, the smooth relative directional shear of the Ekman spiral then exhibits local shears and speed minimums. This is due to the directions and speeds in the spiral being opposite or nearly opposite to the ice velocity vector and of comparable magnitude.

One of the most striking features of the current profiles is the appearance from time to time of swift current below the mixed layer with speeds attaining 60 cm/sec. The depth of maximum velocity ranges from 80 to 190 meters. Although evidence of swift transient undercurrents had been observed in the Arctic Ocean as early as 1937, it was not until 1974 that these currents were shown to be associated with mesoscale eddies.

This data report deals only with the absolute velocity data obtained from the profiling current meter at Camp Blue Fox. PCM data for camps Caribou, Snowbird and Big Bear are in separate volumes (Manley et al., 1980). Data reports pertaining to the salinity-temperature-depth (STD) data taken at the manned AIDJEX camps are also in separate volumes (Bauer et al., 1980).

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